Univerza v Ljubljani

Fakulteta *za arhitekturo*

Doctoral Programme in Architecture

UNIVERSITÀ DEGLI STUDI DI TRIESTE

XXIX Cycle of the Doctoral Programme in Engineering and Architecture

EVALUATION OF PARAMETERS FOR SUSTAINABLE PRESERVATION OF BUILDINGS AND SITES IN THE CASE STUDY OF URBAN REGION GORIZIA - NOVA GORICA

doctoral thesis under joint supervision

doctoral student: Marta Lombardi

supervisors: Dr. Sonja Ifko (UL – FA)

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Ljubljana, Slovenia 2017

Declarations

The present dissertation is the result of a joint supervision doctoral research project between the University of Ljubljana and the University of Trieste that was officialised with an agreement signed on 19th February 2016. The research was carried out at both institutions under the supervision of Dr. Sonja Ifko (UL FA), Prof. Sergio Pratali Maffei (Units) and Prof. Paolo Rosato (Units). Outlined in the Doctoral Study Programme in Architecture at the University of Ljubljana, the research theme was confirmed by the University of Ljubljana on 18.09.2015.

Furthermore, I hereby declare that this thesis was drafted by myself with the supervision of the above cited mentors; that the work contained herein is my own except where explicitly stated otherwise in the text; and that this work has not been submitted for any other degree or processional qualification except as specified.

Marta Lombardi

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Oda a la casa abandonada

(...)

Ahora
cerramos
tus ventanas
y una opresiva
noche prematura
dejamos instalada
en las habitaciones.

Oscurecida
te quedas viviendo,
mientras
el tiempo te recorre
y la humedad gasta poco a
poco tu alma.

A veces una
rata
roe, levantan los papeles
un murmullo
ahogado,
un insecto
perdido
se golpea.
ciego, contra los muros,
y cuando
llueve en la soledad
tal vez
una gotera
suena
con voz humana,
como si all í estuviera
alguien llorando.

S ó lo la sombra
Sabe
los secretos
de las casas cerradas,
s ó lo
el viento rechazado
y en el techo la luna que
florece.

(···)

P. Neruda, 1956

Ode to an abandoned house

(...)

Now we close
your windows
and leave
a stifling
premature night
in the rooms.

All darkened
you continue living,
while
Time runs through you
and the damp slowly
consumes
your soul.

Sometimes
a rat gnaws,
the sheets raise
a suffocated
rustling,
a lost
insect
hits,
blind, against the walls,
and when
it rains in solitude
perhaps
a drop
echoes
with human voice,
as if someone
was crying.

Only the shadow
knows
the secrets
of locked houses,
only
the reflected wind
or the moon above the roof
that thrives.

(...)

(translated by M. Lombardi)

Ode alla casa abbandonata

(...)

Adesso chiudiamo
le tue finestre
e un'oppressiva
notte prematura
lasciamo insediata
nelle stanze.

Tutta buia
tu continui a vivere,
mentre
il tempo ti percorre
e l'umido guasta piano la
tua anima.

Talvolta
un topo rosicchia,
s'alza dalle carte
un
fruscio
soffocato,
un insetto
smarrito
sbatte
cieco contro i muri,
e quando
piove nella solitudine
forse
una goccia
risuona
con voce umana
come se vi fosse
qualcuno che piange.

Solo l'ombra
conosce
i segreti
delle case sbarrate,
solo
il vento respinto
o sul tetto la luna che
fiorisce.

(...)

(translated by D. Puccini)

Oda zapuščeni hiši

(...)

Sedaj zapremo
tvoja okna
in pustimo
da se težka
prezgodna noč
namesti
po sobah.

Zamračena
živiš naprej,
medtem ko
skozi tebe teče čas
in vlaga počasi počasi
razjeda tvojo dušo.

Včasih
miš
grize, dvignejo se listi
v pridušenem
šuštenju,
izgubljena
žuželka
udarja,
slepa v zid
in ko
v osamljenosti dežuje
morda
se kapljica
oglasi
s človeškim glasom,
kot da bi
nekdo jokal.

Le senca
pozna
skrivnosti
zaprtih hiš,
le
odbiti veter
ali na strehi luna,
ki cveti.

(...)

(translated by M. Lombardi)

To Tiziano

Abstract

The present work deals with the problem of sustainable re-use and preservation in architecture, either legally protected or not. Its aim is to provide a method that might assist designers and decision-makers during the whole planning process. This research starts with a literature review of the interpretation of sustainability, followed by the definition of a regulatory framework (international and national) and a comparative analysis of 18 building assessment tools. The three sustainability domains (social/cultural, environmental and economic) are widely accepted, but most regulations and evaluation tools still focus on the environmental component. On the other hand, re-use is becoming more and more important for its key role in future sustainable development. However, only two of the analysed methods deal with the specific task of re-using/preserving historic buildings, so that the GBC HB protocol (Historic Building by GBC Italia) and the Villas model have eventually become the basis for the new method that was developed in reference to the territory of Gorizia and Nova Gorica.

The method is a three-step procedure that guides the user through the knowing phase with a sort of "building ID", towards the definition of compatible use (vocationality analysis) and the planning of a sustainable intervention (sustainability analysis), which simultaneously considers socio-cultural, environmental and economic issues. Each of the last two phases is also provided with an expert-based multi-criteria evaluation model, whose weights are based on a survey that collected opinions from more than 100 experts from Italy, Slovenia and other countries.

The method was continuously refined through the application to some case studies that were selected in equal number between the region of Gorizia and Nova Gorica in order to cover all the three project stages: the preliminary phase or feasibility study, the intermediate and the final planning stage. Finally, the six case studies that are reported in the last part of the thesis prove the method's reliability in dealing with different building types and planning phases, also guaranteed by the possibility of tailoring the sustainability model by including or excluding certain criteria. Nevertheless, the method does not provide definite answers and it does not aim at certifying the sustainability level of projects. In contrast, the interpretation of results is essential, as it forces the user to consider different points of view and, therefore, helps to make rational decisions.

Sintesi

Lo studio affronta il tema della sostenibilità nei processi di riuso e di conservazione del patrimonio costruito, inteso non solo come l'insieme degli edifici sottoposti a tutela, ma anche di tutti quei manufatti che, seppure non direttamente segnalati, possono rappresentare un importante valore per la comunità. L'obiettivo principale è quello di costituire un metodo che possa assistere i progettisti e i decisori in tutte le fasi del progetto di recupero ed aiutarli ad operare scelte consapevoli.

A tal fine è stata dapprima effettuata una ricerca bibliografica sul tema della sostenibilità, di cui vengono riportate alcune definizioni e possibili interpretazioni nella prima parte della tesi. Ognuna delle tre componenti emerse, ovvero la sostenibilità socio-culturale, quella ambientale ed economica, vengono qui descritte e declinate anche in riferimento all'attività di riuso. Segue un'analisi del corpus normativo internazionale, europeo, sloveno e italiano, che dimostra come la triplice natura della sostenibilità si sia già affermata anche in questo settore, seppure esistano attualmente delle indicazioni più specifiche solo in campo ecologico. Tuttavia, ricorrente in questi strumenti legislativi è la preferenza generale per il riuso, spesso inteso come strategia prioritaria per uno sviluppo sostenibile. Dall'indagine "teorica" della sostenibilità si è poi passati ad un approfondimento delle prassi in quest'ambito, proponendo un'analisi comparativa di 18 strumenti di valutazione della sostenibilità degli edifici con valenza internazionale, nazionale o addirittura locale. Anche tra questi vi è una predilezione per la componente ecologica, dato che la maggior parte degli strumenti si focalizza sulla verifica delle prestazioni energetiche dei fabbricati. Ciononostante, in alcuni casi gli strumenti sono stati aggiornati in modo da includere anche l'aspetto sociale ed economico e possono, inoltre, essere applicati a più scale (da quella urbana a quella architettonica), a varie tipologie e funzioni o alle varie fasi di vita di un edificio

(nuova costruzione, ristrutturazione, gestione). Resta, invece, ancora bassa l'attenzione per il recupero degli edifici storici, che viene trattato solo dal protocollo Historic Building di GBC Italia (GBC HB) e dal modello Villas per le ville venete. Proprio a partire da questi e in riferimento al territorio di Gorizia e Nova Gorica è stato sviluppato il nuovo metodo per il riuso sostenibile degli edifici.

Il nuovo metodo consiste in un percorso di tre fasi che guidano l'utente attraverso una prima parte conoscitiva, in grado di fornire un quadro riassuntivo delle potenzialità (valori) e delle criticità (per lo più legate allo stato di conservazione) dell'edificio in esame; la seconda fase, detta "analisi della vocazionalità", è rivolta alla scelta di un uso compatibile in riferimento alle caratteristiche del contesto e dell'oggetto; infine, "l'analisi della sostenibilità" permette di costruire un progetto sostenibile che considera allo stesso tempo le questioni socio-culturali, ambientali ed economiche.

Nello specifico, la prima fase è dotata di una "carta d'identità dell'edificio", ovvero di una tabella che organizza in modo sistematico i dati relativi all'oggetto e al suo intorno. I contenuti si rifanno per lo più alla scheda proposta da GBC HB, mentre la parte sulla definizione dei valori è stata ricavata da un'analisi dei criteri per la valutazione dell'architettura moderna (Docomomo Fiche, Burra Charter e altri documenti). La scelta di trarre esempio dal repertorio moderno nasce dalla complessità della valutazione di questo tipo di manufatti, che offre un'ampia selezione di parametri per poter adeguatamente apprezzare le varie tipologie edilizie e i loro diversi valori (non solo la valenza storico-artistica del bene).

Le ultime due fasi, invece, sono caratterizzate da due modelli di valutazione multicriteriale in grado di affrontare problemi complessi. I parametri di ognuno sono stati definiti con l'aiuto degli strumenti analizzati in precedenza e sono stati gerarchicamente organizzati in due strutture ad albero: l'albero della vocazionalità e quello della sostenibilità. Per i pesi a loro associati si è invece ricorso all'approccio adottato da Villas, raccogliendo i dati attraverso dei questionari che hanno coinvolto oltre cento professionisti italiani, sloveni e stranieri.

Il metodo è stato via via affinato attraverso ripetute verifiche su alcuni esempi concreti del territorio di riferimento. Nella parte finale della tesi vengono presentati sei casi studio, scelti in numero pari tra l'Italia e la Slovenia e in modo da coprire tutte e tre le fasi di progetto: dal preliminare o studio di fattibilità, al definitivo (qui chiamato stadio intermedio in modo da ovviare alle differenze nell'impostazione delle due nazioni) fino al progetto esecutivo. I casi selezionati sono rispettivamente: per la fase preliminare la villa Louise (Ita) e la villa Lasciac sul Rafut (Slo), il castello di Gradisca d'Isonzo e il progetto definitivo per la villa Lasciac, ed infine due progetti da poco realizzati: il nuovo Centro di Salute Mentale di Gorizia e la villa di Vipulzano sul Collio sloveno.

Il continuo confronto con i casi studio ha permesso di organizzare e di definire i parametri in modo più efficace, raggruppandoli diversamente, eliminando quelli superflui e dando la possibilità di includere o di escludere certi criteri per affrontare anche le situazioni di incertezza, soprattutto nelle fasi iniziali del progetto. I test hanno inoltre contribuito alla scelta delle funzioni di normalizzazione dei pesi, influendo direttamente sull'efficienza del metodo in generale.

In conclusione, i casi studio hanno dimostrato che il metodo può essere applicato a varie tipologie edilizie e alle diverse fasi di sviluppo di un progetto, grazie alla possibilità di personalizzare il modello della sostenibilità attraverso la selezione dei parametri. E', tuttavia, necessario sottolineare il fatto che i modelli di valutazione non forniscono risposte certe, né mirano a certificare il livello di sostenibilità di un progetto. Pertanto, l'interpretazione dei risultati è di fondamentale importanza, affinché l'utente possa valutare le ipotesi progettuali da diversi punti di vista e, quindi, operare scelte razionali.

Daljši povzetek

Doktorska disertacija se ukvarja s problematiko trajnostne prenove v arhitekturi s posebnim ozirom na kulturno dediščino v širšem pomenu, ki ne zajema le zavarovanih objektov, temveč tudi tiste, ki so lahko za ljudi pomembno pričevanje. Glavni cilj naloge je ustvariti metodo, ki bi lahko projektante in odločevalce spremljala skozi celoten postopek revitalizacije ter jim nudila pomoč pri zavestnem odločanju.

Raziskovanje se je najprej osredotočilo na pregled literature, ki se ukvarja z definicijo trajnosti. Splošne definicije in posamezne razlage sestavljajočih komponent – družbeno-kuturne, okoljske in ekonomske trajnosti – so zbrane v prvem delu naloge, kjer sem za vsako opredelila tudi dodatno interpretacijo na področju prenove. Nato sem pozornost preusmerila na zakonodajo, tako evropsko kot italijansko in slovensko, ter ugotovila, da se je tudi tu že uveljavilo trojno pojmovanje trajnosti, čeprav so le za okoljski del na razpolago podrobnejše smernice. Ne glede na to, pa je splošen poudarek na nujnosti prenove obstoječega pred novogradnjo kot ključna strategija za prihodnost.

Da bi trajnost analizirala tudi s praktičnega vidika, sem pregledala še najpomembnejše modele za evalvacijo trajnostnih stavb, ki so mednarodno veljavni ali značilni za posamezne države oziroma območja. Nekateri izmed teh so se že prilagodili novemu pojmovanju trajnosti in svoje pripomočke opremili z dodatnimi kriteriji, ki vključujejo tudi družbeno ali ekonomsko komponento, večina pa se še vedno posveča predvsem energetski učinkovitosti objektov. Drugo novost predstavljajo tudi novi aplikativni protokoli, ki se ukvarjajo s posebnimi tipologijami stavb ali z različnimi posegi, od novogradnje do prenove in vzdrževanja. Pri teh pa je opaziti, da sta redki izjemi, ki postavljata problem revitalizacije kulturnih spomenikov, in sicer: model Villas za prenavljanje beneških vil in protokol Historic Building (HB), ki ga je v sklopu LEED sistemov razvil italijanski GBC (Green Building Council). Prav ta predstavljata izhodišče za sestavo nove metode za trajnostno prenovo stavb, ki sem jo razvila za čezmejno območje Gorice in Nove Gorice.

Nova metoda je pravzaprav postopek, sestavljen iz treh korakov, ki zajema začetno zbiranje podatkov in analizo stavbe z območjem, kar omogoča, da se uporabnik seznani z objektom in oceni njegove prednosti (vrednote) in slabosti (v glavnem povezane s stanjem); sledi faza odločanja o novi namembnosti, ki bi morala biti primerna tako za okoliš kot za objekt; nazadnje pa še načrtovanje trajnostnega posega, za katerega je treba zagotoviti določen uspeh vseh treh vidikov trajnosti.

V pomoč odločevalcu je za prvo fazo predvidena t.i.»izkaznica stavbe«; to je preglednica, ki sistematično zbira podatke o objektu in njegovem območju. Vsebinski del izkaznice izhaja v glavnem iz podobne razpredelnice, ki jo predlaga GBC HB, določanje vrednot pa iz analize kriterijev za ocenjevanje moderne arhitekture (Docomomo Fiche, Burra Charter in druge listine), saj predstavljajo objekti iz te dobe zahtevnejšo obravnavo (vrednotijo različne tipologije in ne le estetsko-zgodovinski vidik) ter nudijo zato popolnejši izbor parametrov. Zadnja dva koraka metode pa sta opremljena z evalvacijskima modeloma »vocationality analysis« in »sustainability analysis«, ki izhajata iz multikriterijske obravnave kompleksnih problemov. Kriterije sem izbrala na osnovi pregledanih pripomočkov in jih nato hierarhično uredila v drevesno strukturo. Za določanje posameznih uteži pa sem se delno sklicevala na izkušnjo Villas in preko anketiranja zbrala mnenja različnih strokovnjakov iz Italije, Slovenije in tujine.

Metodo sem večkrat preverila na konkretnih primerih iz obravnavanega območja, kar je omogočilo, da sem pripomočka postopoma izboljšala. Skupno je v zaključnem delu disertacije predstavljenih 6 primerov, 3 iz Italije in 3 iz Slovenije, ki odgovarjajo trem različnim fazam načrtovanja: začetni fazi s študijo izvedljivosti ali idejno zasnovo, vmesni fazi s projektom za pridobitev gradbenega dovoljenja in zaključni fazi s projektom za izvedbo; ti so: vila Louise in vila Laščak na Rafutu (IDZ), grad v Gradisca d'Isonzo in vila Laščak (PGD) ter novi center za mentalno zdravje v Gorici in vila Vipolže, oba obnovljena pred kratkim.

Sprotno testiranje na primerih je pripomoglo k boljši organizaciji in opredelitvi kriterijev: le-te sem drugače združila, odvečne črtala, druge pa natančneje opisala ter uvedla tudi možnost njihovega vključevanja oziroma izključevanja, kar je zlasti pomembno za aplikacijo pri začetnih projektnih fazah. Nato pa so preizkusi tudi vplivali na izbiro primernejših funkcij za normalizacijo uteži in posledično izboljšali splošno učinkovitost metode.

Nazadnje je študija primerov dokazala, da je metoda uporabna pri različnih tipologijah stavb in v različnih razvojnih fazah načrta, saj je ena izmed posebnosti trajnostnega evalvacijskega modela prav ta, da ga lahko uporabnik prikroji situaciji preko izbire parametrov. Treba pa je poudariti dejstvo, da modela ne nudita vedno jasnih odgovorov in nista nikakor namenjena potrjevanju nivoja trajnosti; interpretacija rezultatov je nujno potrebna in je pravzaprav izhodišče, da uporabnik presodi projektne odločitve iz različnih zornih kotov in da se nazadnje racionalno odloči.

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GLOSSARY

ACCOMMODATION	hotels, B&B, hostels, residence halls, etc.
ADAPTIVE RE-USE	regeneration of former derelict spaces through new uses that are compatible with the building, retain its historic character and preserve significant elements of the fabric, although new services, as well as modifications and additions are introduced
ADDED VALUE	improvement or addition to something that makes it worth more; quality of being useful for something
AGGREGATION	collecting of units/parts into a whole; often referred to weights, it indicates the sum operation that leads to a summarised result
ATTRIBUTE	synonym of criterion; here it is used in the general explanation of MCDM approaches with no particular reference to the vocationality or sustainability model
AUTHENTICITY	preserving original qualities and character; in reference to building renovation this is the opposite strategy to historical reconstructions (falsification)
CLUSTER (HOMOGENEOUS)	aggregation/group of similar things; in reference to urban zones it indicates areas that are homogeneous, asthe majority of the buildings have the same purpose
COMMERCIAL & ADMINISTRATION	private offices (studios, etc.) and public administration offices, shops (retail) and service providers
COMPATIBILITY	level of appropriateness/matching of a building/site with a certain new use or between new adopted materials and the existing situation; with reference to vocationality analysis: a particular interpretation of results that summarises outputs from the b&s quality and versatility parameters
COMPLEMENTARY PARAMETERS	parameters that exclude each other
CONSERVATION/CONSERVATIVE	respectful approach to a subject/quality aimed at maintaining its character and values
CONSTRUCTION SITE	plot, area occupied by construction works/activity
CONSTRUCTION	synonym of building or construction works/activity/phase, here meant as re-use/refurbishment/restoration activities, generally not new construction
CONTEXT	larger piece of territory or region
CRITERION	a means or standard of judging by which one particular choice or course of action might be judged to be more desirable than another; here it is usually associated with sustainability analysis, indicating sustainability parameters in general, with no reference to a specific level of the sustainability tree
CRITICALITY	weakness, weak point, negative quality that must be resolved
DOMAIN	area; often used with the three sustainability macro-categories (three pillars)
FINAL PLANNING STAGE	detailed project for construction or post-completion project (as-built project, post-practical completion phase)
FACILITIES	services; something that is built, installed, or established to serve a particular purpose

FEATURE	special quality or characteristic of something (territory, building, site); it is often used as a synonym of criterion in the vocationality model
GENERAL SUSTAINABILITY	final summarised result indicating the project's performance in sustainability analysis; sustainability level/grade
HISTORIC	adjective that indicates the possession of special features that may qualify a subject as a piece of heritage; it usually refers to historical character
HISTORICAL	related to the past, old
INPUT (SCORE)	user assessment, entry value
INTERMEDIATE PLANNING STAGE	project for building permit acquisition or project for procurement and tender phase, intermediate level definition (no preliminary, no final)
KNOWING PHASE	preliminary data collection of the building and its site that offers the possibility to be acquainted with the subject
METHOD	approach; here it is often used to indicate the research result: the new method that was developed for the sustainable preservation of buildings and sites
MODEL	tool; usually it is referred to as the method evaluation tools (vocationality and sustainability assessments)
NORMALISATION	to make conform to (convert) or to reduce to a norm/standard/scale
OPTION	possibility, choice, alternative
OPTIONAL PARAMETERS	parameters that can coexist and may have overlapping effects
OUTPUT	calculated result of evaluation models
PARAMETER	general term used instead of "criterion" with no references to the vocationality or sustainability model (independently used); it usually substitutes the vocationality "feature" and the sustainability "criterion", indicating the characteristic on which the evaluation is based
POSITIVE EXTERNALITIES	term used in economics to indicate indirect benefits to a third party
POTENTIALITY	in general: positive features to be developed; with reference to the vocationality analysis: a particular interpretation of results that summarise outputs regarding context situation (context quality and economic context)
PRELIMINARY PLANNING STAGE	preliminary projects or feasibility studies
PRESERVATION	conservation or even enhancement of special features/qualities/values of a building and its site
PRODUCTION	small factories and artisan activities, includes also shopping centres
PROPOSAL	project or solution
PUBLIC	cultural, educational, sport facilities (buildings and areas), etc.
PURPOSE	use, function of a building
RANKING	classification, rank, position on a scale
RECOGNISABILITY	clear legibility/distinction between original and later elements (opposite of imitation, falsification)
RENOVATION	set of interventions (repairs and modifications) and physical actions that give the building a better appearance and render it ready to use
RESIDENTIAL	houses, apartments, etc.

RESTORATION	re-establishment of a past condition or specific approach to the preservation of architectural heritage
RE-USE/REVITALISATION	to use again an abandoned building, even in a different way; usually it is related to reclamation of building; here it is often associated with "preservation", as re-use of heritage assets demands a particular, conservative approach;
SITE	local context of a building, generally identified with its plot area
SUBURBAN AREA	outlying part of the city/town centre with service-, industrial zones or farmlands/green areas (low density area)
SUITABILITY	adapted to a use or purpose
SUSTAINABILITY ANALYSIS	analysis of the sustainability performance of the preliminary project and its further enhancement by means of simulation of different scenarios that consider all three pillars (and sub-elements) of sustainability
SUSTAINABILITY	refers to the simultaneous consideration of short and long-term effects in the socio-cultural, environmental and economic fields
TAILORABILITY	possibility to personalise or adapt something to different situations
TECHNICAL SYSTEM	all of HVAC, power systems and other technical equipment available in a building
TOWN (CITY) EDGE	zone between the urban centre and the suburban area
TRIPLE BOTTOM LINE APPROACH	simultaneous pursuit of economic, social/cultural and environmental sustainability
URBAN CENTRE	town/city core, historical centre, well serviced, populated and lively area (high density area)
VERSATILITY	possibility of changing in accordance with certain requests or necessities, also: modifiability
VOCATIONALITY ANALYSIS	study of the most suitable new use/feasibility of the re-use on the basis of the potentialities offered by the context and the compatibility of the asset
VOCATIONALITY	inclination to/suitability for a specific new use/purpose
WEIGHT	relative importance of a parameter indicating the priority assigned to the parameter by the DM (here the survey-participants)
WHOLE RE-USE PROCESS	series of actions for the development of a re-use project that include: the knowing phase, the definition of a compatible new use, project development and its performance and management

LIST OF ABBREVIATIONS

AHP	Analytic Hierarchy Process
B&S	Building and Site
BMVBS	Bundesministerium für Verkehr, Bau uns Stadtentwicklung (Federal Ministry of Transport, Building and Urban Development)
BRE	Building Research Establishment
BREEAM	Building Research Establishment's Environmental Assessment Method
BSAM	Building Sustainability Assessment Method (or Model)
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CEN	European Committee for Standardisation
COP	Conference of the Parties
DGNB	Deutsches Gütesiegel Nachhaltiges Bauen (German Sustainable Building Council)
DM	Decision-Maker
EC	European Council
EEC	European Economic Community
EGCT GO	European Grouping of Territorial Cooperation between Gorizia, Nova Gorica and Šempeter-Vrtojba (sl. EZTS, it. GECT)
EMS	Environmental Management System
EPDB	Energy Performance Building Directive
EU	European Union
FBC	Fraser Basin Council
GBC	Green Building Council
GBI	Green Building Initiative
GBTool	Green Building Tool
GPR	Green Performances of Real Estate
HB	Historic Building
HQE	Haute Qualité Environnementale
HVAC	Heating, Ventilation and Air Conditioning
ICLEI	International Council for Local Environmental Initiatives
ID	Identity Card
iiSBE	International Initiative for a Sustainable Built Environment
Intl	International
IUCN	International Union for the Conservation of Nature
IVE	Instituto Valenciano de la Edificación
JaGBC	Japan GBC
JSBC	Japan Sustainable Building Consortium
LCA	Life Cycle Assessment
LCC	Life Cycle Cost
LEED	Leadership in Energy and Environmental Design
MADM	Multi-Attribute Decision-Making

MAUT	Multi-Attribute Utility Theory
MAVT	Multi-Attribute Value Theory
MC	Multi-Criteria
MCDA	Multi-Criteria Decision Analysis
MCDM	Multi-Criteria Decision-Making
MODM	Multi-Objective Decision-Making
MOMP	Multi-Objective Mathematical Programming
NAM	Non-Additive Measure
NPV	Net Present Value
NZEB	Nearly Zero Energy Building
OISE	Osservatorio congiunto su Innovazione e Sostenibilità nel Settore Edilizio
OPN	Občinski Prostorski Načrt (Urban/City Plan)
PBP	Payback Period
PRG	Piano Regolatore Generale (Urban/City Plan)
SBTool	Sustainable Building Tool
SMEBS	Simplifies Method for Evaluating Building Sustainability
SUS	Sustainability
TCN346	Technical Committee on Conservation of Cultural Property
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Vocationality
VTT	Vlation Teknillinen Tutkimuskeskus (Technical Research Centre of Finland)
WCED	World Commission on Environment and Development
WWF	World Wide Fund for Nature
ZVKDS OE NG	Zavod za Varstvo Kulturne Dediščine, Območna Enota Nova Gorica

1 INTRODUCTION

This chapter starts with the presentation of the research theme, which is accompanied by a brief presentation of the background situation based on a literature review (problem definition). Next are illustrated the research objectives, summarised in the research question, and the approach, materials and methods. A last section is dedicated to the thesis structure, where the main parts of the dissertation and its chapter organisation are explained.

1.1 RESEARCH TOPIC

"Regeneration is about change and conservation is often defined as the management of change"[1]. Planning and predicting future impact is a difficult task especially when limitations imposed by existing situations must be related to sustainability complexity. In fact, sustainability refers to a holistic and integrated view of short and long-term effects in socio-cultural, environmental and economic fields[2].

The triple interpretation of sustainability – represented by the above mentioned spheres – is nowadays totally approved in theory, but still needs to become effective in practice. Great effort is being put in this direction through continuous updating of policies and legislation, both on the European and national level, as well as by upgrading building sustainability assessment tools. On the other hand, alternative approaches have recently questioned the "sustainability theory" proposing "resilience[3] thinking" and the "socio-ecological approach" as more effective and realistic strategies (Benson & Craig, 2014; Collier et al., 2013)[4]. Sustainability policies are traditionally associated to the impossible goal of 'maintaining, sustaining, preserving a status quo and criticised for promoting a continued economic growth, which 'threatens to surpass critical socio-ecological thresholds and undermine ecosystem services upon which humans and all other species depend' (Farley & Voinov, 2016, pp. 393, 389). On the contrary, socio-ecological resilience focuses on the capacity for adaptation and change[5] within complex inter-reliant systems, where economy is only one of the sub-systems, which is embedded in society that is part of a finite ecological system (Farley & Voinov, 2016; Collier et al., 2013).

Another difficulty is represented by the preservation of architecture, where the concept of built heritage should not be narrowed only to the group of listed buildings, but should also include all those entities that may have 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS, 2013 p. 2)[6]. Sustainable preservation of such items implies choosing a sustainable economic re-use to be developed with respect to the building and site character and through the clear legibility of actions. Furthermore, all decisions should consider social values and benefits as well as environmental matters (Lombardi et al., 2015 b).

There can be no universal recipe to solve such a great challenge, because each building is a unique case, with its specific, creative solution (Orbasli, 2009), but there can be an approach, a method to follow that can help the designer and decision-maker to make conscious choices. This is indeed the aim of the method that was researched and will be presented in this work (Lombardi, Dealing with the Existing).

[1] Feilden, B. (2003): Conservation of Historic Buildings, Architectural Press, Oxford (third ed.) in Orbasli (2009) p. 3.
[2] A fourth dimension may be represented by political issues, related to governance and active engagement of society (Sonetti et al., 2016).
[3] Resilience can be defined as 'the ability to retain function through adversity' (Brandon & Lombardi, 2011, p. 2).
[4] There are so far two schools of thought and two approaches to sustainability: the first aim at conserving at all cost, even through a drastic change of people's habits, seeking a harmony between nature and human beings; the second believes that technological advancement could fix the problem (Brandon & Lombardi, 2011). Nevertheless the authors sustain that human activity will be judged through the environmental filter and the impacts on our eco-system.
[5] According to Brandon & Lombardi, sustainable development should move towards a process of change, where a certain harmony between the natural and the human world is pursued (Deakin (2005) about Brandon & Lombardi, 2005 (1st Ed.), 2011 (2nd)).
[6] Cited from the "cultural significance" definition, art. 1.2 (Australia ICOMOS: The Burra Charter, 2013). Values are listed in alphabetical order and do not suggest a priority ranking of the aspects; on the contrary, all values are equally important, which is in accordance with the new objective (impartial) approach to evaluation and preservation in architecture.

1.2 PROBLEM DEFINITION

Sustainability is becoming more and more important in architectural practice, especially when referring to re-use or preservation activities[7]. So far much literature has discussed this matter, focusing on a specific topic – for example a certain type of building and area (Zupančič et al., 2013; Lioce & Galli, 2006; Lah, 1995) or referring to more technical issues that are often related to a specific »type« of sustainability, and more frequently, to eco-sustainability (PGL & NTHP: 2011; HC, Dublin City, 2004).

An initial literature review has shown that Slovenia does not really have tools for the evaluation of sustainability buildings[8] (Markelj et al., 2013; Markelj, 2016), whereas there are some interesting results in foreign projects (LEED[9], GBC: EBOM[10]) and in Italy[11] (e.g. ITACA, GBC: HB, Villas project, etc.). As a matter of fact, several methods have been conceived all over the world – e.g. Breeam, Leed, Dgnb, SBTool, etc. – but most of these provide an ex- post application and generally focus on new construction or refurbishment, with no specific regard to heritage issues.

By contrast, there are two exceptions that offer an interesting approch to the sustainable preservation of architecture: the first is the Historic Building protocol (hereafter: HB) that GBC Italia[12] has been developing since April 2012 and which was launched in 2016;[13] the second is an experience within the Villas project[14] (2006) where a group of economists built an evaluation method for the assessment of vocationality[15] and sustainability of re-use projects on the case study of Venetian Villas. Even if this method was conceived ten years ago it has seen so far several applications – even on different building types[16] – which have tested its reliability.

As mentioned in the previous paragraphs there are some interesting methods that try to answer the complex problem of sustainability, but none seems to offer a comprehensive tool for managing a sustainable preservation of architecture. Especially when looking at the Slovenian situation, where no similar instrument was found[17], a new method could be useful. This should indeed gather positive features from existing tools and overcome their limitations, offering a rational support to the multi-dimensional problem of sustainable preservation.

1.3 RESEARCH PURPOSE AND AIMS

The aim of this research is to develop a method that could assist designers (project team) and decision-makers – hereafter defined as »users« - in controlling various factors during the whole design process and guide them towards the definition of a reasonable and sustainable re-use/preservation project. Based on an

[7] The process of re-using existing buildings is a sustainable operation itself, but it encounters technical problems, especially when the planned interventions may compromise socio-cultural aspects, bringing to the loss of the manufact's intrinsic values.

[8] According to Markelj, in Slovenia it is possible to certify a building with internationally recognised tools, such as LEED, BREEAM, DGNB (etc.); however, this is not being done due to a general unfamiliarity with sustainability by clients, a lack of authorised experts and adopted standards that refer to foreign regulations and laws (Markelj et al., 2013, p. 29-30)

[9] LEED stand for "Leadership in Energy and Environmental Design" and is a voluntary building-certification system that has already been applied in more than 140 countries all over the world. For further information see: http://www.leed.net/; or other national GBC homesites, e.g.: http://www.usgbc.org/leed, http://www.cagbc.org/, http://www.gbcitalia.org/certificazione--5?locale=it etc.

[10] Existing Building Operation and Maintenance (EBOM) is a certification tool from 2009 that has been recently adapted for European cases too. See reference guide: U.S. GBC, 2013: *Green Building Operations and Maintenance with alternative compliance paths for Europe.* Available at: http://www.usgbc.org/resources/leed-ebom-2009-reference-guide-supplement-europe-acps

[11] Despite its debatable practice, Italy is considered a leading country in the research field of restoration and management of the built heritage. Its solid and advanced theories have often been a point of reference for other cultures, for instance consider the Venice Charter from 1972.

[12] Green Building Council Italia is an association which is working on LEED protocols and rating systems in agreement with USGBC (US Green Building Council) and GBCI (Green Building Certification Institute). More available at: http://www.gbcitalia.org/page/show/i-sistemi-leed-e-gbc?locale=it

[13] As Vitiello observes evaluation techniques that support a »green« design process by looking beyond energy performance are continually evolving. (Vitiello, 2012, p.73)

[14] The project Villas is part of the Community initiative INTERREG III B (2000-2006) CADSES 3B074.

[15] Vocationality refers to the definition of a compatible new use for an abandoned building.

[16] E.g.: Venice Arsenale (Giove et al., 2011), former industrial buildings (Ferretti et al., 2013) etc.

[17] Except for Markelj's recent study (2016) that leads to the definition of an evaluation tool of building sustainability at early planning stages. The tool is part of a wider model for the planning of sustainable new construction in Slovenia (Markelj, 2016). See also: SMEBS tool in the BSAM cards attached (Attachment I).

interdisciplinary approach to the problem, the method should consider cultural preservation, social benefits, economic viability and environmental responsibility at the same time. Moreover, it is meant for the built heritage in its wider meaning, i.e. including not only listed assets but also potentially interesting subjects that are somehow valuable to people for yielding information about society, art, culture or history in general. Sustainable preservation of such assets implies choosing a sustainable economic re-use to be developed with respect to the building and site character and through clear legibility of actions. As a consequence, the new method should cover the whole design process: starting with data collection, then by the new use definition and finally the project elaboration.

Opposing circumstances can occur both when the project is under development and at an earlier stage, when basic decision – such as the choice of a new building (and area) purpose – should be taken. These are in fact the two main moments of the whole planning procedure when two specific assessment models will intervene. However, the operational framework of the research will also include the phase of knowing the subject/building and site/, which is indeed an essential part of the method. The procedure should, therefore, guide users through three different steps, where two evaluation models will support them in the priority and alternative assessment. The method is primarily meant to be used during the planning phase (*in itinere*), but it might also be applied *ex-post*, to already defined projects, in order to choose the best performing alternative. On top of this, it was developed in reference to the Gorizia – Nova Gorica urban region, but it could also be modified to suit different contexts as well. Predictably, changes could affect parameter weights in the vocationality model and the criteria settings in the sustainability-evaluation part, for these parameters are specifically referred to the examined region.

A final objective of the present study is also to offer a contribution to cooperation between Slovenia and Italy, starting by increasing cooperation between the University of Ljubljana with the University of Trieste through a joint doctoral thesis (or joint supervision PhD programme) and hopefully influencing also the European Grouping of Territorial Cooperation (hereafter EGTC)[18], which is indeed the reference area of this research.

1.4 RESEARCH QUESTION

What are the parameters that influence a sustainable project and how can those aspects, emerging from the socio-cultural, environmental (ecological) and economic areas, be connected into a whole planning process that leads to reasonably sustainable results of preservation projects in the Gorizia - Nova Gorica urban region?

1.5 APPROACH, MATERIALS AND METHODS

Since the study deals with the complex problem of sustainability in preservation activities – where all the three sustainability domains should be simultaneously considered and with respect to existing values that are not only historic or aesthetic – the research focused on the interpretation of sustainability first. A literature review was carried out on this concept in order to investigate possible definitions, related factors, the regulatory framework, both international and national, and, finally, the practical tools and evaluation methods available.

In particular two positive experiences were selected as starting points for their innovative approach of sustainability to historic buildings, so that the new method was actually grounded on the GBC HB protocol (part of the LEED rating systems) and the Villas model. The first one was appreciated for the idea of a building identity card, whose compilation contributes to the identification of the values/qualities and weaknesses of an

[18] EGTC is a tool for trans-border collaboration introduced by CE 1082/2006, which tries to favour and promote cooperation among State Members (at least two), regional and local entities. It is a legal subject, with a convention and a statute that can realize programmes and projects or specific actions in order to solve common problems through coordinated solutions and policies. EGTC GO started to form at the end of 2009 thanks to the Municipalities of Gorizia, Nova Gorica and Šempeter-Vrtojba. It was legally established between the 19/02/2010 (Mayors approval on Agreement) and 15/09/2011 (registration as legal subject). Current partners are also Informest and RRA Severne Primorske.
New European Programme 2014-2020 particularly counts on EGTCs for strategic development, project implementation and as a funding recipient. Therefore EGTC GO has started to work on a "Plan for Local Transborder Development", which includes an analysis of critical situations, opportunities and joined initiatives, in order to attract communitarian investments that would be allocated for synergetic projects.

asset; moreover, the tool shows a certain flexibility, for it adapts the evaluation according to effectively feasible actions. On the other hand, the Villas model offers a systematic approach to the problem of defining a compatible new use and for the assessment of the sustainability level of a re-use proposal. Thanks to a multi-criteria evaluation approach that considers also interactions among criteria it was able to build two different assessment tools, namely the vocationality and the sustainability model. However, both approaches also revealed some weaknesses, either in adequately considering all three sustainability areas or because of a difficult application to different situations (Villas) and to early planning stages (GBC HB). As a consequence, the new method tries to solve these gaps and aims at guiding its user through all the planning steps of re-use, which were defined as follows:

- the first step - »the knowing phase« was based on the building identity card proposed by GBC HB and on the review of the criteria for the evaluation of modern architecture, which represents a complex task and, as a consequence, offers a wide selection of parameters;
- the second phase, where a compatible use should be defined, was derived from the Villas' model that was here adapted and enhanced in order to consider different types and functions;
- the last phase with the sustainability testing of the proposed projects was built with the help of current building sustainability assessment methods.

Two specific evaluation tools (or models) were derived from the Villas experience to assist the user in step 2 and 3; both are an example of expert-based multicriteria decision model, which is currently one of the most popular decision aid approaches. Possible actions, that are more prone to one rather than another sustainability-aspect – are often in conflict. The aim of these tools is to make the user aware of these contrasts, so that he can responsibly choose which aspect should be privileged.

A draft version of the two evaluation tools – the vocationality and the sustainability model – was first built looking at similar tools, integrated on the basis of personal sensitivity and corrected in relation to a selection of study cases from the territory of Gorizia and Nova Gorica. This operation was necessary to outline the model's structure, which allowed to correctly arrange the questionnaires that were next submitted to experts, in order to define the weights of the two assessment models. The opinion collection was carried at different times and with various modalities, actively involving more than 100 persons from Italy, Slovenia and other countries. Once integrated with the data collected, the models were tested again and improved in reference to the study cases. *De facto*, the whole method development was supported by background examples that were cyclically put into relation with the model structure, leading to its continuous refinement.

In conclusion, the materials used for the present research are:

- existing literature and regulations (international, European, Slovenian, Italian) on the sustainability topic;
- current building sustainability assessment methods, GBC HB and Villas model in particular;
- documents and other sources regarding the evaluation of modern heritage;
- archival and project materials for the case studies.

Whereas the following methods were adopted:

- historical method: review of literature and regulations on sustainability;
- descriptive method: review of literature and regulations on sustainability, on multi-criteria decision methods and on the evaluation of modern heritage, comparative analysis of building sustainability assessment methods;
- experimental method: survey with questionnaires and interviews for the definition of the weighting system of the evaluation models, application on a selection of case studies;
- a multi-criteria decision method (MCDM) derived from the multi-attribute value theory (MAVT): for the assessment procedure in the two evaluation models.

1.6 THESIS STRUCTURE

The thesis is divided into five parts, excluding the introduction.

Chapter 2 presents the state of the art on sustainability: first, a literature review of the meaning and interpretation of sustainability is provided (2.1), followed by an analysis of sustainable practice (2.2) with a look on the regulatory framework (2.2.1), on the relation between sustainability and re-use (2.2.2) and with an analysis of current building sustainability assessment methods (2.2.3).

Chapter 3 focuses on the new method: the first part explains its structure and how each step was built (3.1); the following part contextualises the evaluation approach that was adopted (3.2); the weight definition of the evaluation models is summarised next (3.3), whereas the last part of this chapter is a sort of user manual, where all parameters are described in detail and the method operation is fully presented (3.4).

Chapter 4 offers some examples of the method application on a selection of study cases, whose results are discussed in chapter 5 with general conclusions.

After the references and bibliography, there is an appendix gathering some background material that concurred to the development of the method and was not included in the main part in order to facilitate a fluid presentation of the whole work. Therefore, the following material was attached: a section with Building Sustainaility Assessment Method cards (Attachment I), a detailed explanation of the expert questionnaires and results (Attachment II), some tables showing definitive weights (Attachment III), blank tools for the three steps of the new method (respectively Attachment IV, V and VI) and filled-in evaluation models (vocationality and sustainability analyses) for all case studies (Attachment VII).

2 CURRENT SITUATION

This part focuses on the interpretation of sustainability in theory (2.1) and in practice (2.2). The first part presents the state of the art in literature, where the interpretation of sustainability is investigated from the history of the development of the concept until its triple definition, where each sustainability domain is also explained and related to the re-use activity. In the next part, sustainability is analysed with regards to legislation – international, European and national (Slovenian and Italian) regulations – and to current building sustainability assessment methods (BSAMs), with an earlier comment on re-use as a sustainable strategy.

2.1 SUSTAINABILITY: HISTORY AND DEFINITION

2.1.1 Origins of a Concept

Since the first definition of sustainability, proposed by the Brundtland Commission in 1987, as a 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (WCED, 1987, p. 41), this global issue has deeply changed over time, both in its meaning and understanding.

The rather generic explanation, which emphasised the long-term perspective dimension of the problem, was soon related to a "green" point of view, aimed at educating people to environmental-friendly behaviour and finding innovative solutions for our needs through new, advanced technologies that help our ecosystem. Later, sustainability turned into a complex problem including not only the ecological sphere, but also the social component – regarding democracy, social justice and equity (McKenzie, 2004) – in addition to economic health; the latter has become more and more urgent due to the recent crisis, that questioned the sustainability of development based on economic progress and evidenced a lack of connection between growth and social and environmental issues (Moldan et al., 2012).

Thus, sustainability is nowadays composed of three inter-related systems that can be represented with a concentric and progressively nested diagram or in a model with three overlapping dimensions (Carew & Mitchell, 2008). Both aim at representing the simultaneous pursuit of economic prosperity, environmental quality and social equity, which are also known as the "three pillars of sustainability" (Lee, 2009). In addition to the already accepted three domains, what the literature agrees on is also the necessity of an interdisciplinary approach. According to McKenzie 'sustainability is now a broad multi-focal agenda' that 'calls for interdisciplinary input and a cohesive view of the interrelation of nature, society and economy' (McKenzie, 2004, pp. 1, 5). A similar opinion results from the definition proposed by the University of South Australia: 'Sustainability—including sustainable environments, sustainable societies and sustainable economies. This priority would mean attention *inter alia* to issues relating to water use, renewable energy, democratic citizenship, social justice, equity, the impact of globalised economies on work and the triple bottom line' [19] (McKenzie, 2004, p. 11); and is again confirmed in Fraser Basin's Council's Charter[20] which states 'consideration of social, economic and environmental dimensions, examining the interconnections and integration among these dimensions, and a long-term perspective that does not give preferential treatment to current generations at the expense of future generations' (FBC, 2011, p. 3)

[19] John Elkington coined this term in 1994 as an accounting framework to evaluate business performance in a broader perspective; in a later moment it was applied also to the evaluation of sustainability. The principle was defined as a simultaneous condition of sufficiency of the social, environmental (ecological) and financial part: 'We need to bear in mind that it is not possible to achieve a desired level of ecological or social or economic sustainability (separately), without achieving at least a basic level of all three forms of sustainability, simultaneously.'(Elkington, 1999, p. 75 cited in McKenzie, 2004, p. 6)

[20] The Charter defines sustainability as 'Living and managing activities in a way that balances social, economic, environmental and institutional considerations to meet our needs and those of future generations.' (FBC, 2009, p. 5)

2.1.2 Evolution of a Concept

Currently, there is a large debate on sustainability and on the triple bottom approach, which were rather put aside in favour of a "resilience thinking"[21] (Collier et al., 2013). Some authors claim that sustainability is an outdated concept, since it is an impossible goal to pursue 'in a world characterised by such extreme complexity, radical uncertainty and lack of stationarity' (Benson & Craig, 2014, p. 777). In their opinion sustainability 'refers to the long-term ability to continue to engage in a particular activity, process, or use of natural resources', while a sustainable development is grounded on the idea of economic progress that has ultimately brought to a general failure of environmental governance[22] and to the establishment of the Anthropocene[23] (Benson & Craig, 2014, p. 777-778). Moreover, strong criticism was expressed with regard to the assumption of stationarity and equilibrium of socio-ecological systems (SES) related to the sustainability concept. On the contrary, the concept of resilience 'acknowledges disequilibrium and non-linear changes of SESs'[24] and would allow 'a more realistic approach to management'[25], since the new goal would be to avoid critical thresholds (Benson & Craig, 2014, p. 779).

Nevertheless, the term "resilience" is not recent, since it dates back to the 1970s, when it was first used in the field of ecology by C. S. Holling, who defined it as 'a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables' (Holling, 1973, p. 14). Several other definitions followed which linked the term resilience to "vulnerability" (in an inverse relation), to "return or recovery-time", to "risk" and "critical threshold" (disturbance absorption and adaptation capacity)[26], etc. (Romero-Lankao et al. 2016; Pizzo, 2015; Saunders & Becker, 2015; Collier et al., 2013; Mahboob, 2012; Pisano, 2012). According to Romero-Lankao et al., consistent definitions of both 'sustainability and resilience have remained elusive, because existing concepts are subject to widely differing framing and interpretations'; (...) 'far from being resolved issues, (they) are procedural and shifting concepts, that are repeatedly framed, resolved, and contested anew' (Romero-Lankao et al. 2016, p. 2). Their 'definitions intersect, complement, or contradict each other' (Romero-Lankao et al. 2016, p.1). In fact, Saunders & Becker notice that "sustainable planning" and "resilience planning" are nowadays often used inter-changeably, although the two concepts might be complementary (Saunders & Becker, 2015; Lizarralde et al., 2015; Mahboob, 2012): some authors reconciliate the terms linking resilience to the short-term capacity of coping with adverse events and conceiving sustainability over the long term (e.g. ensuring future generations can survive and thrive) (Saunders & Becker, 2015); others affirm that sustainability encourages impact reduction on the environment to avoid changes while resilience encourages adaptation to changes; even though, both paradigms adopt a systems approach to the understanding of complexity, highlighting the importance of taking a holistic view of highly interconnected variables (Lizarralde et al. 2015).

In conclusion, the present work will mainly refer to the sustainability concept in order to limit the variability of the problem/task and to arrange a manageable approach/method, grounded on well-known principles. However, it is important to point out that a "sustainable strategy" will here not aim at maintaining a *status quo*

[21] 'Resilience thinking provides a framework for viewing a social-eco-logical system as one system operating over many linked scales of time and space. Its focus is on how the system changes and copes with disturbance' (Pisano, 2012, p. 10).

[22] Benson and Craig mainly address to the failure of the Rio +20 goals, which were unable to mitigate climate change and modify human behaviour (Benson & Craig, 2014). However, also Brandon & Lombardi affirm that interest in resilience is connected to irremediable global warming (Brandon & Lombardi, 2011).

[23] 'The Anthropocene defines Earth's most recent geologic time period as being human-influenced, or anthropogenic, based on overwhelming global evidence that atmospheric, geologic, hydrologic, biospheric and other earth system processes are now altered by humans.' Definition available from: http://www.anthropocene.info/

[24] According to Romero-Lankao et al., 'resilience is not conceived as a return to normality, but rather as the ability of complex ecosystems or socio-ecological systems, such as cities and urban communities to change, adapt, and crucially, to transform in response to both internal and external stresses and pressures' (Romero-Lankao et al., 2016, p. 5).

[25] 'A resilience approach would reorient current research and policy efforts toward coping with change instead of increasingly futile efforts to maintain existing states of being' (Benson & Craig, 2014, p. 780). In addition to this, many scientists believe that the adoption of 'resilience thinking provides a framework for viewing a social-ecological system as one system operating over many linked scales of time and space [notwithstanding that] its focus is on how the system changes and copes with disturbance' (Walker and Salt, 2006, pp.38, cited in Pisano, 2012, p. 10).

[26] Socio-ecological resilience can be described by three characteristics: 1) the amount of change the system can undergo and still retain the same controls on function and structure; 2) the degree to which the system is capable of self-organisation; 3) the ability to build and increase the capacity for learning and adaptation (Carpenter et al., 2001, cited in: Resilience Alliance[26]; Benson & Craig, 2014, p. 779, Pisano, 2012, p. 9; Pizzo, 2015, p. 133)

of resources, but will rather represent a continuous research of a case-specific acceptable solution – i.e. balance among the contrasting socio-cultural, environmental and economic component.

2.1.3 The Three Pillars and Active Preservation

Environmental Sustainability

As generally accepted, three sustainability categories are identified as the well-known environmental sustainability, the social and the economic. The first dimension arises from the definition of sustainability proposed by IUCN, UNEP and WWF[27] in 1991: 'improving the quality of human life while living within the carrying capacity of supporting eco-systems', where the concept of intragenerational and intergenerational equity first referred to the environment and renewable resources (Melià, 2010, p. 13; IUCN et al., 1991, p. 10). In their study on engineering academics' conception of sustainability, Carew and Mitchell showed that environmental sustainability was identified with the themes of "resource management/care" and "safeguarding ecosystems", where both focused on the maintenance or responsible utilisation of ecosystems products and services. In addition to this, there are two more themes that have been identified in common with the social domain. These are: "responsibility and balance" – that deal with taking responsibility for and managing impacts on both the environment and society – and "minimising impacts", which advocated the necessity of mitigating environmental impacts by considering the whole lifecycle as well as protecting society and social diversity (Carew & Mitchell, 2008).

Despite the fact that environmental sustainability was the first to be developed in this field, its relation to preservation activity is relatively recent. In fact, Vitiello believes that the European directive 2002/91/EC represents the first attempt to enhance the discipline of restoration, by considering the possibility of improving the energy performance of a listed building to regulatory standards, though in respect of its special character. However, if this is the only link between preservation and sustainability in its wider meaning, a reduction has certainly occurred in the problem definition of both fields: 'the application of sustainability to the restoration activity cannot be reduced to a mere energy retrofit', for sustainability is the preservation activity itself, that includes also the conservation of all the irreplaceable values (spiritual, cultural, economic, social) and the relations that the subject has bound with its territory (Magrini & Franco, 2016; Vitiello, 2012).

Socio + Cultural Sustainability

On the other hand a lot has been written by McKenzie on social sustainability. In his research paper the author defines it as a 'life-enhancing condition within communities, and a process within communities that can achieve that condition', which includes: equity of access to key services and between generations, cultural relations and integration, political participation, transmitting awareness of social sustainability, sense of community responsibility and collective identification (McKenzie, 2004, pp. 14-15). The same objectives are reported again by Carew and Mitchell, who group them under the "holism and society" theme and the "participatory process" (Carew & Mitchell, 2008).

Nevertheless, referring to the preservation and re-use practice, social sustainability should rather focus on public involvement in the decision process, public usability and benefit derived from an area – which are directly related to the quality of spatial design and the well-being of people – and, finally, on collective values and attachment of a community to a building or a site that should be respected and possibly implemented[28]. In particular, community identity is often ignored when talking about cultural heritage (Vitiello, 2012), even if the concept of "heritage" is strictly connected to people's perception and identification of values – aesthetic or

[27] Respectively: International Union for the Conservation of Nature, United Nations Environment Programme, World Wide Fund For Nature.
[28] Similar factors are at the base of the COBACHREM Model (Community-Based Cultural Heritage Resources Management) reported by Susan O. Keitumetse (Keitumetse, 2014).

other. Therefore, when referring to preservation, it might be more appropriate to talk about a single category, “socio-cultural sustainability”.

Economic Sustainability

Finally, the concept of economic sustainability has often been related to inter-generational equity or inter-temporal distributional equity, which try to maximise the total sum of welfare of different generations, which should however guarantee intra-generational equity as well – i.e. between present people – by pursuing optimal development (Stavins et al., 2003; Sen, 2000). A broader definition was proposed with the concept of ”business imperative”, which includes not only wealth creation and distribution or economic payoff over the long term, but also affordable and profitable solutions (Carew & Mitchell, 2008). Often defined with the term “feasibility”, this notion involves profitability – considering incomes, returns, productivity, values and other externalities – and cost accounting. A literature review has suggested that economic sustainability and feasibility in architecture are mostly verified through Life Cycle Assessment or Life Cycle Costs methods (hereafter: LCA, LCC), which include: pre-operations (stripping and demolition), construction (various forms), operation and maintenance, until the end of life of a building (Pombo et al., 2016; Bohne et al., 2015; Galle et al., 2015; Laprise et al., 2015; Tajani & Morano, 2015; Zhong & Wu, 2015; Cetiner & Ecem, 2014; Moschetti et al., 2014; Bambagioni, 2012; Kalutara et al., 2012; Vrijders et al., 2012; Yung & Chan, 2012; Andrade & Bragança, 2011; Mateus & Bragança, 2011; Bragança et al., 2010; Fernández-Sánchez & Rodríguez-López, 2010; Bragança & Mateus, 2007). According to Pombo et al., Net Present Value and Payback Period (hereafter: NPV, PBP) are the most widespread indicators for LCC analysis, which is again confirmed by other studies (Pombo et al., 2016; de Santoli et al., 2015; Cetiner & Ecem, 2014; Ferreira et al., 2013; Vrijders et al., 2012; Bragança et al., 2010).

However, economic sustainaility does not depend only on LCC, but also includes the additional condition of economic feasibility, which can be referred to as self-financing possibilities (Bambagioni, 2012; Yung & Chan, 2012), financing opportunities – private resources (Bohne et al., 2015) or public subsidies (Zhong & Wu, 2015; Raslanas et al., 2013; Vrijders et al., 2012) – or to cost coverage (positive cash flow) in all phases (Bohne et al., 2015; Bambagioni, 2012), defined as dynamic efficiency by Stavins et al (Stavins et al., 2003). Moreover, the concept of profitability (Giove et al., 2011) involves marketability (potential demand and offer) (Bambagioni, 2012), occupancy rate (Zhong & Wu, 2015) and price/rent affordability (Alwaer & Clements-Croome, 2010). On the other hand, externalities are usually positive implications on the territory and community, that are often addressed as non-monetary benefits and thus hardly measurable. These are for instance: public utility (Bambagioni, 2012), the development of new economies and jobs (Kalutara et al., 2012; Yung & Chan, 2012), tourism (Zhong & Wu, 2015; Vitiello, 2012), area revitalisation and increase of property values (Zhong & Wu, 2015; Yung & Chan, 2012). Finally, several other components concur in economic sustainability and project feasibility, as for example riskiness of operation (Giove et al., 2011), assumptions' sensitivity (reliability) (Bambagioni, 2012) and value stability (preservation of initial value) (Alwaer & Clements-Croome, 2010).

A serious risk that may occur during the preservation and re-use process of a building is that it may lose its characterising qualities due to an incompatible new use or an unsustainable cost of restoration and maintenance (Lioce & Galli, 2006). An effective economic reuse could guarantee economic feasibility and an “active preservation” of the subject through minimal impact on the original asset (Dallavalle et al., 2006 a). As a consequence, economic sustainability deals with the problem of using available resources to their best advantage, promoting efficient and responsible use, likely to provide long-term benefits for the community.

Triple Sustainability and Historic Buildings

In conclusion, as stated by European Guidelines for improving the energy performance of historic buildings EN 16883[29], what should be taken into account is conservation and long-term use. Moreover, the document defines four aspects of sustainability, as follows:

— Environmental sustainability: Materials and energy used within the whole-life cycle of a building including its erection, operation, maintenance, refurbishment and dismantling. These processes should be based mainly on renewable resources and have the lowest possible greenhouse gas emissions. Historic buildings should be sustained through respecting the existing materials and constructions, discouraging the removal or replacement of materials and the use of new materials which require reinvestment of resources and energy with additional greenhouse gas emissions.

— Economic sustainability: All economic factors such as market value, revenues and operating costs of a historic building should permit its long-term function.

— Social sustainability: A historic building should contribute to its local and social context in terms of function as well as aesthetic and social imprint.

— Cultural sustainability: A historic building is a finite resource that should be managed so as to retain its heritage for present and future generations.

In the sustainable management of buildings, all four sustainability aspects should be taken into account and an appropriate balance sought between them, understanding that they are complementary and mutually dependent, rather than isolated aspects (CEN TC 346, 2015: EN 16883, p.19).

[29] Since 2015 CEN TC346 (European Committee for Standardisation: Technical Committee on Conservation of Cultural Property) has been developing the prEN 16883: Conservation of cultural heritage - Guidelines for improving the energy performance of historic buildings, which is currently under approval.

2.2 SUSTAINABILITY IN PRACTICE

2.2.1 Regulatory Framework: from the International to Italy and Slovenia

Even if the triple interpretation of sustainability is nowadays generally accepted and well known by professionals, it is not yet familiar to common people and, therefore, less frequent in everyday practice. Nevertheless, worldwide politics is trying to fill this gap by introducing goals and guidelines that promote an interdisciplinary approach, as in the case of Agenda 21 encouraging public participation or in European directives and amendments that continuously upgrade their list of principles. On the other hand, national legislation in Italy and Slovenia, as well as in other member states, continuously implements European regulations, although with a certain delay (Uil et al., 2015).

The International and European Framework

The following table summarises the chronological evolution of European and international regulations[30] concerning sustainability and sustainable development since 1972[31]:

Table 1: International and European Regulations on Sustainability

YEAR	EVENT/ACT	MAIN CONTENTS
1972	1st UN Conference on Human Environment, Stockholm: **Declaration on Human Environment**; "**Limits to growth**" by MIT	• social welfare, environmental heritage protection
1980	UNEP, IUCN, WWF, Nairobi: **World Conservation Strategy: Living Resource Conservation for Sustainable Development**	• sustainable development as a world priority
1987	WCED (UN), Tokyo: **"Our Common Future"** or **The Brundtland Report**	• definition of sustainability
1991	UNECE, Espoo: **Espoo Convention**	• Environmental Impact Assessment in a Transboundary Context
1992	2nd UN Summit "Earth Summit": **Rio Declaration** on Environment and Development >**Agenda 21**	• national rights and responsibilities: public participation, biodiversity, climate, shared principles on sustainable management and development
	EU, Brussels: **5th Action Programme on the Environment**	• EU strategies for sustainable development 1992-2000
	EEC, Council Directive 92/43/EEC – **Habitats Directive**	• conservation of natural habitats and of wild fauna and flora, Special Areas of Conservation, Natura 2000
1994	ICLEI, Aalborg: 1st European Conference on Sustainable Cities and Towns: **Aalborg Charter**	• sustainable urban development
1996	2nd European Conference on Sustainable Cities and Towns, Lisbon: **Lisbon Action Plan**	• mechanisms for sustainable development
	UN Conference on Human Settlements 2, Istanbul: **Habitat Agenda, Istanbul Declaration**	• importance of local Agenda 21 • adequate shelter for all • human settlement safety, health, liveability, equity, sustainability
1997	UNFCCC, COP3 Conference, Kyoto: **Kyoto Protocol**	• emission reduction targets
1998	UNECE, Aarhus: **Aarhus Convention** (see Directive 2000/60/EC – Water Framework Directive)	• access to Information, public participation in decision-making and access to justice in environmental matters

[30] Sources: www.sustainablecities.eu; http://www.consilium.europa.eu/; http://ec.europa.eu/environment/eussd/; http://www.sinanet.isprambiente.it/it/sia-ispra/filarete/normativa/internazionali?set_language=it; https://sustainabledevelopment.un.org/; the table was also integrated with Markelj's review of international conventions (Markelj, 2016, p. 26-27).

[31] The table provides a selection of the most relevant steps/agreements dealing with sustainability issues. See also: Brandon & Lombardi, 2011, pp. 7-11.

1998	EU, Brussels: EU Framework for Action for Sustainable Urban Development; 1411/2001/EC	• sharing best practice examples • 4 challenges for European cities: globalisation, social integration, urban environment, public governance
2000	3rd European Conference on Sustainable Cities and Towns, Hannover: **Hannover Call**	• issues of future urban life • Agenda 21 and cooperation
2001	EC, 3rd Conference on Environment, Gothenburg: **Gothenburg Declaration, 1st EU Sustainable Development Strategies (SDS)**	• environmental policy • local Agenda 21 • greening and structural funds
	EU, Brussels: **6th Action Programme on the Environment 2001-2010**	• climate change • environment and health • nature and biodiversity • management of natural resources • education as a path to change
	Council **Resolution13982/2000** on architectural quality in urban and rural environments	• integration of environmental policies • no change without education
2002	World Summit on Sustainable Development, Johannesburg: **Johannesburg Declaration**	• upgrade of Rio objectives (Rio + 10) • Agenda 21 further application
2004	4th European Conference on Sustainable Cities and Towns, "Aalborg + 10": **Aalborg Commitments**	• 10 commitments regarding Local Agenda 21 (increased awareness of integrated policies as flexible and practical tools)
2005	EC, Luxembourg: implementing Community Lisbon Programme (1996)	• growth and employment • innovation and defence of human resources
2006	EC, Brussels: **Revision of EU SDS**	• climate change and clean energy • sustainable transport • sustainable consumption & production • conservation and management of natural resources • public health • social inclusion, demography and migration • global poverty and sustainable development challenge
2007	5th European Conference on Sustainable Cities and Towns, Seville: **Seville Declaration; Leipzig Charter on Sustainable European Cities**	• confirmation of Aalborg objectives • active European platform • integrated urban planning acts
	EC: First progress report on SDS	• biennial reports on SDS
2008	EU, Brussels: **2008/98/EC – Waste Framework Directive**	• basic waste management principles: "polluter pays principle", "extended producer responsibility"
2009	EU, Brussels: **Review of EU SDS; New Waste Framework Directive**	• climate change, low-carbon economy
	Council Directive 2009/47/EC – Birds Directive	• conservation of wild birds, Special Protection Areas, Natura 2000
2010	6th European Conference on Sustainable Cities and Towns, Dunkerque: **Local Sustainability Declaration, Call on Climate Action**	• local governments vs. current economic, social, climate change • adoption of **Europe 2020 Strategy** (COM/2010/639): smart, sustainable and inclusive economy, more efficient and greener, employment, social cohesion
2011	Directive 2011/92/EU – Environmental Impact Assessment	• assessment of the effects of certain public and private projects on the environment
	EC: Energy Roadmap	• 2050 Energy strategy (COM/2011/885) : decarbonising the energy system
2012	UN, 3rd Conference on Sustainable Development – Earth Summit 2012 – "Rio + 20": "The Future We Want"	• green economy • international coordination for sustainable development
	UNFCCC, Doha: **Doha Amendment**	• second period of commitment of the Kyoto Protocol (2013-2020)

2013	7th European Conference on Sustainable Cities and Towns, Geneva	• European Sustainable Cities Platform • A green and socially responsible economy: a solution in times of crisis?
2014	EC, **Framework for EU climate and energy policies** in the period 2020-2030 (COM(2014)15)	• emission reduction, renewable energy, energy efficiency
2015	UNFCCC, COP 21, Paris: **Paris Agreement**	• sustainable low-carbon future, after 2020 (see Kyoto Protocol)
	UN: Transforming our World: the **2030 Agenda** for Sustainable Development	• 17 sustainable goals and 169 targets by 2030
2016	8th European Conference on Sustainable Cities and Towns, Bilbao: **Basque Declaration**	• new sustainable pathways • local government actions for a sustainable Europe • discussion on EU Urban Agenda and Habitat III

Several other European directives[32] concern energy efficiency and are, indeed, the only references that provide quantified targets and more detailed specifications.

Table 2: European Directives on Energy Efficiency

DIRECTIVE/DOCUMENT	TITLE/CONTENT
2002/91/EC	Energy performance building directive (EPBD)
2005/32/EC	Energy-using Products (EuP) framework
2006/32/EC	Energy end-use efficiency and energy services – Energy services directive
2009/28/EC	Renewable directive
2009/29/EC	Revised emissions trading directive
2009/125/EC	Ecodesign directive (amends 2005/32/EC)
2010/30/EU	New energy labelling directive (amends 92/75/EEC)
2010/31/EU	Energy performance of buildings - EPBD (amends 2002/91/EC)
2012/27/EU	Energy efficiency directive (amends2009/125/EC, 2010/30/EU, repeals 2004/8/EC, 2006/32/EC)
(2013/13/EU)	(Energy efficiency directive adaptation due to accession of Rep. of Croatia)

National Legislation: Slovenia and Italy

Of course, Italy and Slovenia, as member states of the EU, are continuously incorporating European (and international) guidelines within national policy-making. With reference to sustainability, Slovenia has set several goals – human health and public participation, biodiversity, sustainable resource usage and renewable resources, energy demand and labelling, product certification and economic viability – that are fostered by a series of upgrading acts: starting in 2002 with the Spatial Management Act[33] and the Construction Act[34], followed by the Environmental Protection Act[35] (2006), the Spatial Planning Act[36] (2007), Rules on Efficient Use of Energy in Buildings[37] (2008) with Technical Directives for Efficient Use of Energy[38] (2010), up to the most

[32] https://ec.europa.eu/energy/en/topics/energy-efficiency
[33] ZUreP-1 (Zakon o Urejanju Prostora), Ul RS n. 110/02 and its subsequent amendments (hereafter: & i.s.a.)
[34] ZGO-1 (Zakon o Graditvi Objektov), Ul RS n. 110/02 & i.s.a.
[35] ZVO-1-UPB1 (Zakon o Varstvu Okolja), Ul RS n. 39/06 & i.s.a., implementing European directives 91/692/EEC, 96/61/EC, 96/82/EC, 2001/42/EC, 2003/35/EEC, 2003/87/EC, 2004/101/EC.
[36] ZPNačrt (Zakon o Prostorskem Načrtovanju),Ul RS n. 33/07 & i.s.a., in compliance with 2001/42/EC.
[37] Pravilnik o učinkoviti rabi energije v stavbah, published in 2008, was substituted in 2010 with a newer version containing technical guidlines, Ul RS n. 52/10. It implements 31/2010/UE and 98/34/CE directives.
[38] TSG-1-004:2010 (Tehnične smernice za graditev: učinkovita raba energije), in line with 31/2010/UE.

recent Energy Act[39] from 2014. According to Markelj, Slovenia also released in 2011 the Construction Products Act (enhanced 2013)[40] regarding the sustainable use of natural resources and in 2015 an Action Plan for nearly zero energy building (NZEB)[41] (Markelj, 2016).

On the other hand, Italy launched in 1993 its first Plan for Sustainable development in accordance with Agenda 21. Definition of principles for sustainable development can be found in the Environmental Regulation Dlgs 152/2006, integrated by Dlgs 4/2008, whereas the Action plan for environmentally sustainable consumption of public administration was approved in 2008 and updated with DM 10/4/2013. Another important reference point is certainly Dlgs 42/2004 – Cultural heritage code – that implemented the Built heritage protection act from 1939 by including also landscape as a feature to preserve (Ornelas et al., 2016).

As for the Slovenian case, also Italian legislation on energy matters is particularly abundant: Dlgs 192/2005 implements first EPDB and was followed by Dlgs 311/2006, DPR 59/2009 and DM 26/6/2009 - guidelines on energy certification; Dlgs 115/2008 acknowledged 2006/32/EC, Dlgs 28/2011 is the so called Renewable Act, whereas Dlgs 15/2011 concerns Ecodesign. EPDB 2 (2010/31/EU) was recognised with the L. 90/2013, but among the latest operational tools released there is DM 26/6/2015[42], which provides new standards according to 2012/27/EU (Uil et al., 2015).

An Italian peculiarity is that the Regions are designated for lawmaking on energy matters (Art. 117 of Italian Constitution), according to national principles and guidelines. This is, according to the national Report OISE[43] 2015, a critical point, since it implies different approaches and energy performances across the Italian territory: on one hand, some regions have introduced strict measures in order to promote renewable energies, rational use of water and thermal insulation - the leading examples are the autonomous areas of Bolzano and Trento, Lombardy, Piedmont, Emilia-Romagna, Liguria and Valle d'Aosta; on the other hand, no prescriptions have been set, but rather simple guidelines have been adopted that try to support sustainable building (Uil et al., 2015).

Despite the great effort put into policy, the energy aspects still prevail, or better, still lead the way in sustainable development by means of standards and measurable objectives that are so far the only ones available. Moreover, specific energy targets are usually associated only with new construction or major renovations, whereas no prescriptions are provided for improvements on existing buildings, especially for historic assets or architecturally valuable buildings (Republic of Italy, 2015: DM 26/6/2015; Republic of Slovenia, 2010: TSG-1-004:2010; Ascione et al., 2015; Mazzarella, 2015; Vitiello, 2012). 'Due to inadequacy and incompatibilities of the actual building codes and standards requirements to the particular construction, architectural and material characteristics of existing buildings, several scholars are targeting the urgent need to adapt the legislation that regulates the construction sector to allow more flexible and proportional interventions on built heritage' (Ornelas et al., 2016). At the moment, one of the most renowned European regulation dealing with architectural heritage is the 'Convention for the Protection of the Architectural Heritage' signed in Granada in 1985. Since historic listed buildings in Europe account for almost 18% of total energy demand of buildings, the energy retrofit of such assets is considered the new challenge for research (Ascione et al., 2015; Mazzarella, 2015). Yet, Magrini and Franco notice that the lack of standard approaches to historic buildings is slowly coming to a resolution with CEN TC 346 activity and its recent publication of European Guidelines for improving the energy performance of historic buildings (CEN TC 346, 2015: EN 16883), which seek a shared procedure for selecting appropriate measures (Magrini & Franco, 2016). Even if this is a good starting point, it is still far from a holistic approach to the sustainability problem.

[39] EZ-1 (Energetski zakon), Ul RS n. 17/14 and 81/15, adopting: 2009/72/EC, 2009/73/EC, 2009/28/EC, 2009/125/EC, 2010/30/EU, 2010/31/EU, 2012/27/EU.
[40] ZGPro-1 (Zakon o gradbenih proizvodih), Ul RS n.82/13.
[41] Akcijski načrt za skoraj ničenergijske stavbe (RS MZI, 2015) defines limitations on primary energy demand and minimum percentage of energy from renewable resources (Markelj, 2016, p.26).
[42] DM 26/6/2015 provides new minimum requirements and standards and substitutes DM 26/6/2009.
[43] Observatory of Innovation and Sustainability in the Construction Sector.

2.2.2 Re-use and its Key Role in Sustainable Development

Among sustainable principles cited in Slovenia's Spatial Planning Act there is 'the priority of renovation over new construction' (Republic of Slovenia, 2007: ZPNačrt, art. 3). Pre-existence is in fact a great opportunity for sustainable development (Magrini & Franco, 2016), where cultural heritage plays a specific role in achieving the Europe 2020 strategy goals for 'smart, sustainable and inclusive growth' because it has social and economic impact and contributes to environmental sustainability (Council of the EU, 2014: EN 142705)[44]. Taking advantage of the building stock is itself a sustainable action that conserves soil, energy and thus money. Moreover, built stock is something that all countries have, a resource that is often put aside in favour of new building. Nevertheless, re-use practice has become a much discussed topic since 2000 and has gained in importance with strategies connected to "adaptive re-use" (Bullen, 2004).

Even though in the past many studies had proven that reusing a building might be as cost effective as its replacement (Orbasli, 2009), it is nowadays clear that benefits from re-use are varied. In addition to costs or savings, also non-monetary advantages, should be considered in order to obtain a correct evaluation of expedience, yet some of these outcomes might not be easily quantified.

Among the intangible values proposed by Orbasli there are collective values derived from the preservation of variety, character and sense of familiarity of a place. Furthermore, preserving a building, especially if it is or might be under statutory heritage protection[45], could add value not only to the property but also to those in its vicinity and could drive the tourism economy thanks to increased attractiveness and safety (Orbasli, 2009).

On the other hand, in reference to quantifiable profits, tangible environmental benefits and strategies of improvement have been widely investigated and demonstrated. Research on the environmental convenience of building re-use in the U.S. has shown that 'savings from reuse are between 4 and 46 percent over new construction when comparing buildings with the same energy performance level' and that a period of 10 – 80 years is necessary to overcome the impact created by the construction of a new energy efficient building (PGL & NTHP, 2011, pp. 7-8).

Despite the widely espoused benefits from re-use, it is still not affirmed in practice due to different barriers, such as for instance: lack of transparency in the retrofit market, financial drivers, preference of cosmetic retrofits (PGL & NTHP, 2011) or perceived problems associated with health and safety, increased maintenance, increased rental returns that may be required, inefficiencies in building layout and commercial risk (PGL & NTHP, 2011; Bullen & Love, 2010). Notwithstanding these issues, building sustainability assessment methods – to be discussed in the next section – are somehow promoting reclamation by means of new application profiles designed for such interventions. Most of them have enhanced their previous versions – meant for new construction purpose only – with extra-protocols for existing buildings or renovation projects. In a few cases, the assessment method works also on the urban scale, with reference to both new building and existing areas (Lombardi, Dealing with the Existing).

[44] Council of the European Union, 2014: Conclusions on cultural heritage as a strategic resource for a sustainable Europe.

[45] It often happens that, due to long beaurocratic procedures, a building might be culturally relevant, but has not yet been listed. Since its values are intrinsic and already perceived by people, it potentially has the same effects as other protected assets.

2.2.3 Evaluation Tools: Building Sustainability Assessment Methods (BSAMs)

First and Second Generation BSAMs

Similar to the definitions of sustainability, building sustainability assessment methods (hereafter BSAMs) have also made huge steps since their first versions dating back to the 1990s. Introduced as a tool to evaluate the actual quality of a project (König, 2010, p. 96 cited in Markelj et al., 2013) their main role is to 'verify and present the building characteristics with the use of selected and verifiable standards' that represent 'goals and principles of sustainable development' (Markelj et al., 2013, p. 22); or, quoting Ness et al.: 'The purpose of sustainability assessment is to provide decision-makers with an evaluation of global to local integrated nature-society systems in short and long term perspectives in order to assist them in determining which actions should or should not be taken in an attempt to make society sustainable' (Ness et al., 2007, p. 499).

The first generation of such methods focused – as a consequence of sustainability interpretation – mainly on the environment and the use of energy, therefore leading to the certification of a so-called "green building". According to Markelj's review, the first widely used BSAM was the British BREEAM, launched in 1990 and followed by the French HQE in 1996, the international GBTool from 1998 that developed from the Green Building Challenge 98, the American LEED from the same year and which is nowadays one of the most widespread, in addition to the Japanese CASBEE since 2001[46] and the Australian GREEN STAR presented two years later[47]. On the other hand, the recent second generation of BSAMs have also taken into account socio-cultural, technical and economic aspects – which deal with the entire lifecycle of the building – leading to the assessment of an actually "sustainable building" (Markelj et al., 2013; Markelj, 2016).

Deriving from the previous methods, the new tools are continuously upgraded and adapted to different countries, planning scales (urban, neighbourhood, building), types of operation (new construction, refurbishment, retrofit, etc.) and in reference to building types or construction elements.

According to Magrini and Franco's observations, 'in Great Britain BREEAM is used as an environmental assessment method and rating system for buildings that sets criteria for best practice in sustainable building design. (...) Its Energy section is based on GB National assessment methodologies', becoming a country specific tool. On the contrary, iiSBE's mission, as an international organisation, 'is to facilitate and promote the adoption of policies, methods and tools to accelerate the process towards a global sustainable built environment. Its building performance assessment system, known at first as GBTool and now called SBTool, can be configured to suit almost any local condition or building type. It is based on the SB Method for rating the sustainable performance of buildings and projects. National chapters of the organisation contribute to customize SBTool methodology, to take into account local dispositions.' In fact, the Italian ITACA tool was developed in cooperation with iiSBE Italia by customising the SBTool to Italian national application and it was further adapted for regional application (Magrini & Franco, 2016).

Despite the continuous improvements, many authors still blame BSAMs for being incomplete, because they don't consider adequately the social and the economic dimensions of sustainability (Ferreira et al., 2013; Raslanas et al., 2013; Mateus & Bragança, 2011). This was also demonstrated by a comparison of initially eighteen BSAMs, later reduced to fourteen[48], which proved that almost half of the tools examined take into account two sustainability areas, whereas only a few of them – Dgnb, Enerbuild, Open House, SBTool and Superbuildings – include also the economic component (Figure 1). Predictably, all of them deal with environmental sustainability, which demonstrates again that the problem arose from here to move forward to an integrated understanding of the matter (Lombardi, Dealing with the Existing).

[46] http://www.ibec.or.jp/CASBEE/english/download [Accessed on 01.07.2016]
[47] See: http://new.gbca.org.au/green-star/ [Accessed on 01.07.2016]
[48] Some of the initial 17 BSAMs have been excluded due to superficial information, whereas in other cases two country-specific profiles of the same tool have been merged together. As a result, the following have been considered: Breeam (international and Great Britain), Casbee (Japan), DGNB (Germany), Enerbuild (European Alps area), Gpr Gebouw (The Netherlands), Green Globes (Canada and USA), HQE (international and France), Itaca protocol (Italy), LEED by GBC US (international), GBC HB profile by GBC Italia (Italy), Open House (international), PdC (Spain), Promise (Finland), SBTool (international), SuperBuildings (international).

BSAM Building Sustainability Assessment Method			APPLICATION PROFILES				SUSTAINABILITY		
NAME	APPLICATION	CRITERIA No.	NC New Construct.	EB Existing B. Renovation	MB Building Managem.	UD Urban Districts	ENVIRON MENTAL	SOCIAL	ECONO MIC
BREEAM	GBR	47	✓	✓	✓	✓	✓	✓	✗
CASBEE	JPN	46	✓	✓	✓	✓	✓	✗	✗
DGNB	DEU	≤50	✓	✓	✓	✓	✓	✓✓	✓
ENERBUILD	EU Alps	16	✓	✗	✗	✗	✓	✓	✓
GPR GEBOUW	NLD	16	✓	✓	✓	✓	✓	✗	✗
GREEN GLOBES	USA CAN	53	✓	✓	✗	✗	✓	✗	✗
HQE	INTL FRA	14	✓	✓	✓	✓	✓	✗	✗
PROTOCOLLO ITACA	ITA	45	✓	✓	✗	✗	✓	✓	✗
LEED	INTL ITA	56 55	✓✓	✗✓	✓✓	✓✓	✓	✓✓	✗
OPEN HOUSE	INTL	56	✓	✓	✗	✗	✓	✓✓	✓
PdC	ESP	51	✓	✓	✗	✗	✓	✗	✗
PROMISE	FIN	44	✓	✓	✗	✗	✓	✗	✗
iiSBE SBTool	INTL	≤191	✓	✓	*included*	✗	✓	✓	✓✓
SuperBuildings	INTL	32	✓	✓	✗	✗	✓	✓	✓

Figure 1: Comparative Table of Current BSAMs

Grey crosses indicate that the application profile is not explicitly available, but might be included in a different protocol, whereas a double tick marks a special attention on the matter.

Analysis of Current BSAMs

Research into BSAMs has been conducted with the aim of finding interesting solutions and criteria setting for the new method. In all, 18 models have been selected, trying to include the most common as well as some local tools that disclose the necessary information[49]. Selected BSAMs offer an international or local application, follow different assessment and rating procedures, but are generally meant for labelling or certification purposes. In detail, the tools listed below have been studied and described in the cards that can be found in Attachment I, where some basic information on the developer, year, assessment subjects or available protocols and evaluation procedure have been summed up.

- BREEAM[50] (UK)
- CASBEE (Japan)
- DGNB (Germany)
- ENERBUILD (EU project)
- GPR (The Netherlands)
- GREEN GLOBES (USA, Canada)
- HQE (France)
- ITACA Protocol (Italy)
- LEED (USA, Italy)
- OPEN HOUSE (EU project)
- PdC (Spain)

[49] In many cases information on parameters and assessment methods was undisclosed due to the non-gratuity of the service.
[50] See: List of Abbreviations.

- PromisE (Finland)
- SBTool (International)
- SMEBS (Slovenia)
- SuperBuildings (EU project)
- VALIDEO (Belgium)
- VILLAS (Italy)
- VILLARINHOROSA (Brasil)

Observations

Thanks to review articles, available data published on the tool websites and attached user manuals or operating guidelines, it was possible to draw up a list of the criteria considered by each BSAM in order to evaluate the sustainability performance of a construction. Such parameters were gathered into a comparative table (Table 3) where the initial list of criteria was suggested by the DGNB's SBTool due to the greatest number of parameters.

Analysis of the existing BSAMs showed that most of them aim to provide a final certification or rating[51] that is valid in the developer's nation. In addition to this, many of them have adopted a tailored model that can be exported to other countries by modifying the importance of a certain parameter (weight) or setting national standards as benchmark values[52]. On the other hand, European research programmes[53] provide more complete tools, since their aim is to compare existing methods, provide a list of common criteria in order to show how different systems could be uniformed in the future.

Furthermore, the analysis has evidenced many positive features as well as some limitations: apart from privileging environmental issues[54], most of them are meant for an ex-post evaluation on an already realised project, whereas just a few of them have been improved to follow the planning phase[55] – though mostly at a final planning stage. In any case, all of them[56] start the assessment procedure when the new function had already been chosen, not considering the delicate phase of finding a suitable economic use (new use).

Nevertheless, most BSAMs are LCA-oriented, which means that the parameters should consider the impact along the entire lifespan of a building. They differ in the criteria number and organisation, but in general all adopt a scoring method and aggregate the result by means of weighting. On the contrary, almost none of them – except from Villas and LEED - GBC HB[57] – considers criteria related to the preservation of heritage, even if their model can be applied to both new construction and refurbishment of existing buildings.

In spite of this, the criteria list provided by BSAMs is quite long: on average there are 50 entries, while the SBTool leads with 191 parameters. Other interesting characteristics include the possibility of applying BSAMs to different building types (and scales) and tailorability, which is the opportunity to personalise the tool according to a specific situation or to stakeholders' preferences, as might occur in the setting of subjective targets or national standards.

[51] Except for: Enerbuild, SuPerBuildings, Villas; there might be others as well however, as certain BSAM information was insufficient.
[52] E.g.: Breeam, Dgnb, Leed, HQE, SBTool, SuPerBuildings.
[53] I.e.: Enerbuild, Open House, SuPerBuildings.
[54] Environmental parameters are usually more numerous than those referring to other fields.
[55] Such as for instance: PdC, SBTool, SMEBS (for early planning stages, by Markelj) and Villas.
[56] Except for the Villas project (2006).
[57] In their article, Magrini and Franco, present a similar analysis of BSAMs concerning historic buildings, concluding that 'GBC HB appears to be the most specific tool' (Magrini & Franco, 2016).

Table 3: Table of BSAM Parameters

MACRO-CATEGORY	CATEGORY	o	x	BREEAM	CASBEE	DGNB	ENERBUILD-Energy	GPR Gebouw	GREEN GLOBES	HQE	ITACA	LEED HB	OPEN-HOUSE	PdC	PromisE	SBTool	SMEBS	SuPerBuilding	VALIDEO	VILLAS	VILLARINHOROSA
				UK	JAP	D	EU	NL	USA - CAN	FR	ITA	ITA	EU	ESP	FIN	Intl	SLO	EU	Bel	ITA	BRA
SOCIO-CULT. SUST.	PROCESS QUALITY	COMMUNITY ENGAGEMENT & VALUES	public involvement in the decision process	x		x	i						x			x		x			
			fulfilment of current needs	i		o	x						x			o		i			
			respect for people's values													x		i		x	
			increase of values (future potential beliefs & rituals)																		
			heritage awareness			i														x	
		PUBLIC USE & BENEFIT	public use and usability of covered areas		(o)	x							o			o		o	(o)	o	
			public use and usability of external areas			x					x	x				x					
			socialisation facilities			x						x				i		x	x		
			employment			o															
			social purpose / mission					i													
		PROJECT & CONSTRUCTION QUALITY	townscape & landscape (project integration with context)		x						i							x	x		
			design innovation	x								x									
			construction quality assurance (mat.documentation, testing...)	x		x	x		i	x			x		x	x					
		MAINTETNANCE & MANAGEMENT	documentation for facility management (handbooks/guidelines)			x	x		x	x	x	x		i	x	x			x		
			EMS documentation (targets, policy, future improvement)						x												
			maintenance ease and accessibility (systems)		x		x	i	x	x			x		i		x		x		
	CULTURAL HERITAGE	SAFETY & REGULATORY COMPLIANCE	accessibility		x	x		o x		x	x		o x	x				(o)	x		
			acoustic safety			x				x	x					x			x		
			fire resistance			x				x			x			x	o				o
			hygiene & health (indoor space functionality, availability, services)		x	i				i						x			x		
			structural & earthquake resistance		x	i						x				x					
		LOW INVASIVITY	layout type													o				x	
			structures																	x	
			finishing & decorative elements									x								x	
			technical systems			x														x	
		REVERSIBILITY & ADAPTABILITY	structures	x				o				x	o			x			o	x	
			finishing & protection	x								x								x	
			interior partition	x								x					x				
			decorative elements	x																x	
			technical systems	x	x	x									x	x			i	x	
		MATERIAL COMPATIBILITY	structures																		
			interior partition																		
			finishing & protection									x									
			decorative elements																		
		RECOGNISABILITY	*new elements (structure/partition)*																		
			gap filling / reconstructions (dec.el.)																		
	USER COMFORT & PERCEPTION	INDOOR COMFORT	hygrothermal comfort	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x
			indoor air quality	x	x	x		x	i	x	x	x	x		x	x	x	x	x		x
			acoustic quality / comfort / privacy	x	x	x		x	x	x	x		x			x	x		x		x
			visual comfort	x	x	x		x	x	x	x	x	x		x	x	x	x	x		x
			electromagnetic comfort							x	x		x			x		x	i		
			water quality						x		x		x		x						
		PERCEPTUAL QUALITY	indoor design quality												x	x			x		
			exterior views from inside (perceptual comfort)	x	x											x			i		
			visual privacy		i											x					
			personal safety (perception)					x	i				x			x	x		i		
			quantity and quality of exterior spaces	i	x	x			i	x						x			x	x	x
ENVIRONMENTAL S.	ENERGY EFFICIENCY	ENERGY CONSUMPTION	energy consumption monitoring (metering)	x	x			i	x	x	x			i			x		i		
			primary energy demand	x	x		x	x	x	x	x		x	i	x	x	x	x	x		
			thermal insulation of the building envelope	x		x	x		x	x	x	x	x	x			x		i		x
		SOLAR (WIND) SHADING	natural barrier		o	o	o			i	o	x				x					
			architectural elements							i						x					
		ADVANTAGES FROM SOLAR SUPPLY	passive components	x	o		o x			o											
			thermal inertia	x	x		x									o					
			optimisation of natural lighting / orientation / daylight use	x	x	x	x		x		x						i	x			i
		TECHNICAL SYSTEM EFFICIENCY	energy production from renewable resources		o x	i	o	o x	x	x	o x	x	(o) i	o x	o x	x		x	o		x
			distribution (network insulation)	i			x			x											
			emission (energy efficient systems)	x	x		x	i	x	x			x			x					
			control / regulation / ease of use	x	x	x			x	x					x	x	x				
			presence of regenerators						x	x											
		RATIONAL USE OF WATER SUPPLIES	reduction of water amount for external use	o x	o	o		o	x		x	x	o	o	o	x	o	o	o		o
			reduction of water amount for other uses	x		o			x	x	x					x					

MACRO-CATEGORY	CATEGORY	o	x	BREEAM	CASBEE	DGNB	ENERBUILD-Energy	GPR Gebouw	GREEN GLOBES	HQE	ITACA	LEED HB	OPEN-HOUSE	PdC	PromisE	SBTool	SMEBS	SuPerBuilding	VALIDEO	VILLAS	VILLARINHOROSA
ENVIRONMENTAL S.	ECOLOGICAL IMPACT	GREEN TECHNOLOGIES & MATERIALS	reuse of existing building material & finishing	o	o x						x	x	o i	o	x	x	i	o	o		x
			certification of origin & low embodied energy building materials or low toxicity	x	x	x	x		x	x	x	x	x	x	x	x	x	x			
			bio-based or recycled material or future reuse and recyclability	x	x	x			i		x	x	x	x	x	x	x				x
			local origin / transport				x				x	x	x			x	x				x
			durability & maintenance (+ cleaning)	x	x	x				x			x		x	x	x	i	i		
		LOW HEAT ISLAND EFFECT	roofing		o						x	x				x					i
			external paving								x	x				x					
		LOW ACOUSTIC POLLUTION	indoor to outdoor noise limitation		x	x		o					o				i	o			i
			technical system noise limitation		x		x			i							x					
		LOW LUMINOUS POLLUTION	automatic lighting systems	x	o				x	x		x	o			o	o				i
			external limitations	x						x		x									
		WASTE OPTIMISATION	waste management (reduction, recyclability, energy production...)	x		x			x	x	x		x			x	x		o		x
	ENVIRONMENTAL QUALITY	IMPROVEMENT OF EXTERNAL GREEN AREAS	reclamation of degraded areas		o	o	(o)	o	o		x	x				x	oi	o x	o		i
			historical or local rearrangement / protection / biodiversity		x		i		x		x	x	x		x	x	x	x			x
			hanging garden / green roof									x									
			ground permeability								x		o		x			x			
			provision and quality of walkways for pedestrian use	i						x					x	x					
		TRANSPORT FACILITIES	public transport	o x		o	x		x		x	x			o x	o		o	o		o
			bicycle facilities	x		x			x		x	x	x		x	x					
			parking facilities	x		x			i			x				x					
		IMPACT ON NEIGHBOURHOOD	impact on daylight/solar energy potential of adjacent property		x											x					
			impact of building user population on public transport (peak)													x					
			impact of building user population on local road capacity		x											x					
	CONSTRUCTION SITE MANAGEMENT	RESOURCE USAGE	water	o x		o				x		x				o		x	o		
			energy	x						x		x						x			
			ground	x						x	i	x			o			x			
		POLLUTION REDUCTION	luminous pollution	o		o				x		x	o			o			o		
			acoustic pollution	x						x											
			low dust	x		x				x								x			
			soil and water contamination	x	i					x	x					x					
		WASTE OPTIMISATION	waste management	x					x	x	i	x		x	x	x	x	x	o		
		IMPACT ON NEIGHBOURHOOD	impact on local viability, residents and commercial facilities							i						x					
ECONOMIC S.	LCC	RECLAMATION COST				LCC	LCC						LCC			LCC		LCC			
		PURCHASE COST				i	i						i			i		i			
		TRANSFORMATION COST				i	i						i			x	x	i			
		Operation & maintenance COST				x	i						i			x	x	x			x
		DEMOLITION COST					i						i			i		i			
	BENEFIT ON CONTEXT	EFFECTS ON TERRITORY	economic benefits from project on local community			o														x	
			spread of new economic activities / impact on local economy													x				x	
			increse of economic value of adjacent properties													x	i			x	
	ECONOMIC FEASIBILITY	RISK																i		o	
		FINANCEABILITY																		o	o
		PROFITABILITY																		o	
		COMMERCIAL VIABILITY				x										x	x	i		o	o
	OTHER	AFFORDABILITY OF RENTAL OR COST LEVELS														x	i				
		VALUE STABILITY											x					x			

Criterion presence in BSAM is marked with an "x" if referred to the criterion from column x, or more generally to the issue from the upper level "o"; if the parameter is not explicitly considered, then is noted down with "i" for the x column items and with "(o)" for the above grouping. Red colour indicates modified elements: new entries or definition change (if compared to initial list of considered criteria).

GBC HB and Villas Model – a Starting Point

Since the present work deals with sustainable re-use in general terms, so to consider both legally protected buildings or not, among all the analysed BSAMs only two experiences are particularly valuable for their inclusive vision of the problem and their rational approach. Therefore, this chapter will focus on the GBC HB protocol and the Villas model, which represent also the starting point for the development of the new method.

GBC HB TOOL

The GBC[58] Historic Building (hereafter: GBC HB) is part of the LEED[59] tools, a system of voluntary certification of buildings developed by the international organisation US GBC. LEED rating systems are nowadays applied in more than 140 countries worldwide and currently provide five profiles, excluding the Italian GBC HB: Building Design and Construction (BD+C), Interior Design and Construction (ID+C), Building Operations and Maintenance (O+M), Neighbourhood Development (ND) and Homes (Magrini & Franco, 2016). LEED methods are promoted in Italy through GBC-Italia, which recently released the GBC HB – a new tool for the 'sustainability certification of conservation, renewal, restoration and integration of historic buildings of different uses'.[60] It is a rating system based on a holistic approach that evaluates the environmental performance of the building in relation to the restoration issues, or better, only in reference to possible actions, i.e. actions that are actually feasible because they respect the existing construction (Vitiello, 2012; Rugginenti & Franchini, 2010).

The tool has been developed since April 2012, but its definitive version and manual were published in June 2016. The protocol checklist is based on the LEED template, providing prerequisites and credits that are organised into six thematic areas, including one new entry*:

- Historic Value*
- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation in Design
- Regional Priority

Each area and sub-criteria has a pre-defined rating system that the user can find in the attached Manual (GBC Italia, 2016) in order to define his scoring. At the end of the process the project obtains a final score that awards him a Basic, Silver, Gold or Platinum Certification.

Magrini and Franco praise the tool especially for two criteria that are specifically meant to deal with historic buildings: 'the Historic Value and the Design Innovation which satisfy the need to apply principles of sustainability also to architectural conservation, maintenance or renovation'. In addition to these, there are two more interesting areas: Innovation in Design Process, which concerns the innovative practices aimed at sustainability, and Regional Priority, that highlights the importance of local conditions in determining best practices of sustainability design and construction. Even if GBC HB mainly refers to the Italian context, the protocol can be potentially applied also internationally (Magrini & Franco, 2016).

A particularly fascinating feature of the HB Protocol is that the scoring system can be tailored to specific cases,[61] favouring the overall preservation rather than ecological performance. However, analysing the tool more accurately some gaps can be noticed. First of all, some important parameters are missing, as for example

[58] Green Building Council.
[59] Leadership in Energy and Environmental Design.
[60] http://www.gbcitalia.org/page/show/gbc-historic-building?locale=it
[61] During the Historic value phase the user can delete some options and their score because the type of actions is totally unfeasible (would compromise aesthetic or other building qualities). The final (obtained) score is then compared to a target which is lower than an ideal but impossible situation.

social sustainability, which is here interpreted just as the preservation action of the building and not related to community involvement nor values. Moreover, economic sustainability has been totally ignored. Secondly, the preservation issue is all condensed in the historic value, where the attention is mostly turned to the fact-finding surveys (and diagnosis), that have later no significant relation with the conservative operations. Finally, as Vitiello states, the Protocol is meant only for legally protected buildings and 'it is also based on the mutual assistance or cooperation among different professional figures, which implies a fragmentation of the evaluation procedures, impeding the true comprehension of the building needs and the support in the task of planning' (Vitiello, 2012, p. 75).

Furthermore, Magrini and Franco notice, that the tool can be applied mainly at the end of the design process, for it requires a series of detailed information on the implementation of the whole restoration, the systems commissioning and management planning. The project team is also asked to demonstrate possible solutions for performance improvement by filling in a form (identity card of Historic Building) within which evidence must be provided quantifying all the historical parts of the building subject to renovation. Such a request does definitely not consider the difficulties in collecting the necessary information nor is it concerned about the risk of a too high approximation (Magrini & Franco, 2016).

The Villas Model and Evaluation Method

The Villas model is one of the results achieved within the Villas project, a Community initiative INTERREG III B (2000-2006) CADSES 3B074, where a group of economists developed a multiple criteria (hereafter: MC) analysis model for the evaluation of the sustainable reuse of built heritage (Dallavalle et al.: 2006 b). Initially tested on Venetian Villas, the model was later adapted to other study cases – e.g.: Venice Arsenale (Giove et al., 2011), former industrial buildings (Ferretti et al., 2014), Palazzo Artelli in Trieste (Ognjanovic, 2012-2013) – demonstrating its wider applicability and efficacy.

The Villas model is composed of two tools or profiles: the so called Vocationality model and the Sustainability model. The first is a MC model that analytically measures the feasibility of the economic reuse of historical buildings and expresses by a quantitative indicator their compatibility with different kinds of use – in this case limited to residential, office or hotel purposes. The analysis is based on a group of indicators that are hierarchically organised into three main levels: objective, criteria and attributes that sum up the economic, geographic, infrastructural, environmental and architectural features of the building, hence considering both intrinsic and extrinsic factors (Dallavalle et al., 2006 a). There is a total of 4 parameters in the objective level, 12 criteria and 23 attributes that are specific for Venetian Villas (Figure 2).

The second model aims to evaluate a sustainable reuse of built heritage, which should lead to a balanced economic re-use project. The tool was also developed in a MC framework that addresses a 3-4 level structure of sustainability parameters (Figure 3), where the following sets of criteria and sub-criteria are generally considered (Dallavalle et al., 2006 b):

- reversibility: the possibility of removing elements that would be added to the building by the re-use project;
- versatility: the possibility of easily changing the economic use of the building with limited physical modifications;
- invasivity: the effects of the transformation required by the reuse on the cultural characteristics of the building;
- context respect: the effects of the reuse on the surrounding environment;
- financial and economic feasibility: the profitability of the reuse project.

Finally, the sustainability model counts 21 attributes and 58 indicators (sub-attributes), which are assessed by the user in reference to a specific re-use project. His or her score is then aggregated by means of expert-based

weights. The final result is expressed on a 0-1 scale, which is rather intuitive and simple to compare with the results of alternative projects or different scenarios.

As a matter of fact, one of the most noteworthy qualities of the Villas model is the objective evaluation method at the basis of both profiles. Since the problem of sustainable re-use is a complex decision, the model adopts the typical hierarchical structure of the Value Tree Analysis – the tree structure, where the roots are the target and the leaves are the low-level criteria (Giove, 2006). The evaluation approach follows the Multi-Criteria Decision Analysis (hereafter: MCDA), an approved economic methodology able to deal with complex problems, where several values – that are sometimes even in conflict – must be considered and ranked (Ferretti et al., 2014). The model has adopted one of the most common MC approaches, which is based on the Multi-Attribute Value Theory (hereafter: MAVT) 'a valuable and increasingly widely-used tool to aid Decision-making in the domain of sustainability assessment and urban and territorial planning, where a complex and inter-connected range of environmental, social and economic issues must be taken into consideration and where objectives are often competing, making trade-offs unavoidable' (Ferretti et al., 2014, p. 2). A mathematical function is then used to aggregate the criteria values into a single index or score. In this case the algorithm is a multi-linear operator, an approach that enhances the features of a Weighted Averaging (WA) by considering also interactions among subsets of criteria, which are represented by NAMs; non-additive measures. The "basic values" of the single criteria weights as well as the value of their combinations are the average value expressed by a panel of experts, who have been asked to express their judgements in a questionnaire (Giove, 2006). Their opinions were collected with the method of edges, where the experts had to consider (and assess) all possible combinations of subset criteria in extreme conditions (i.e.: optimal and worst). All judgements were then summarised through arithmetic mean into weights, which contain both the nominal value of the single parameter and all contributions (surplus value) obtained by the simultaneous fulfilment of other criteria within the same subset.

Even if the Villas model has been criticised for having an economic perspective, the method is certainly appreciable for its systematic and objective approach to the problem. Moreover it has already proved its efficiency in different situations, although in those cases the parameters had to be reset, which means that a new model had to be built, but following the same procedure. Besides, as it was noted for the HB, this instrument could be improved introducing other sustainability and vocationality factors related to various types and uses or more parameters for conservation issues (Lombardi et al., 2015 a).

The new method, that will be presented in the next chapter, proposes again the vocationality and the sustainability tools, however, with a completely new set of parameters and weights, which allow a wider application of the method, i.e. to a wider group of building types. In detail, the new vocationality model increases the number of considered uses to five different options, while many parameters are added to describe the Gorizia and Nova Gorica area, ranging from the territorial, to the neighbourhood and the architectural scale[62]. On the other hand, the three sustainability domains are not fully considered by the Villas' sustainability tool; furthermore, many criteria are specific for Venetian Villas, hence unsuitable for other buildings. Therefore, criteria list is here enriched with the aspects that are generally included in other BSAMs, leading to a completely new tree of criteria[63].

Additional inspiring features of the Villas tool are the MC evaluation procedure and the expert-based weights, which are also adopted by the new method, albeit with several adjustments demanded by the large number of criteria. Finally, the method also introduces a preliminary informational phase to the Villas approach and guarantees a major flexibility of the sustainability tool, by including some extra-options to solve indeterminate situations.

[62] The new vocationality tree is divided into 4 levels with 4 main parameters splitting into 12 sub-elements, 27 features on the next level and finally up to 35 specifications.

[63] In the new method the sustainability model is composed of the three well-known macro-categories, next of 10 categories, 21 aspects and 69 criteria (most specific level).

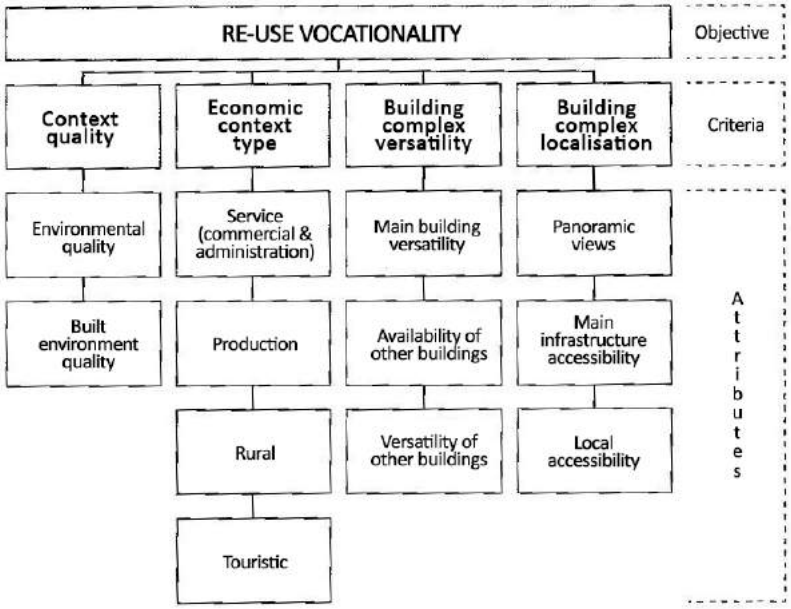


Figure 2: Villas Vocationality Tree

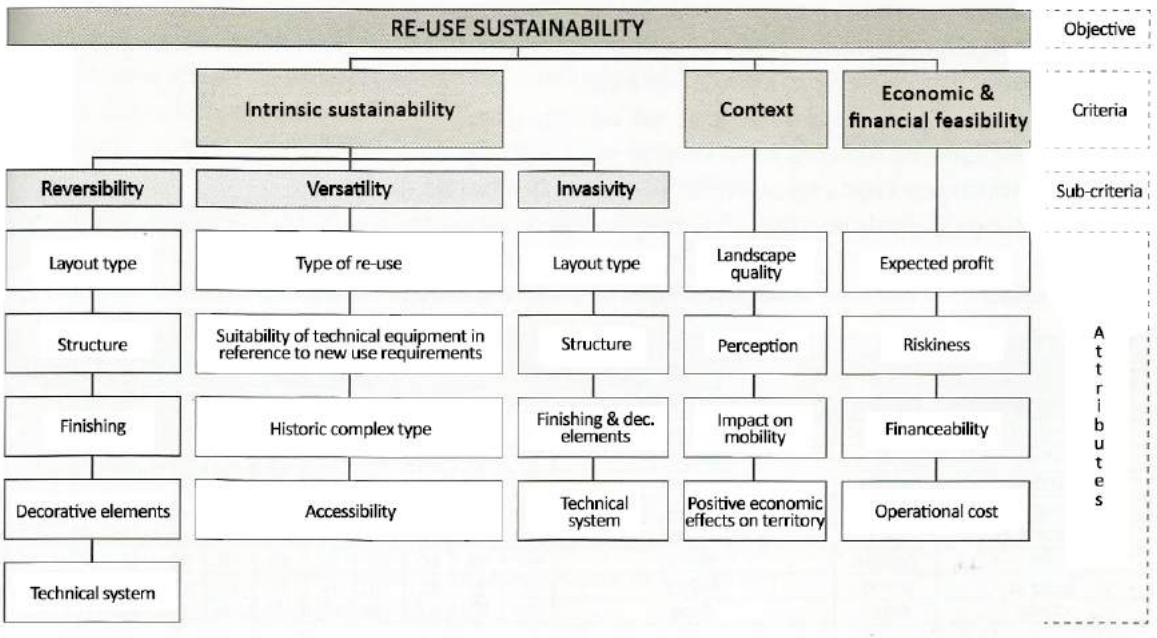


Figure 3: Villas Sustainability Tree

3 THE METHOD: TOWARDS SUSTAINABLE PRESERVATION/RE-USE

In this part the methodology is presented: chapter 3.1 explains how the research and its method were developed, starting with goal definition and general structure description, followed by the selection and organisation of specific criteria in reference to the three steps of the procedure, and, finally, the evaluation method with its weights determination; the following chapter (3.2) introduces the evaluation principles and methods adopted, while the next chapter (3.3) focuses on the definition of the model weights: the general approach is explained first and later the final vocationality and sustainability weights are presented. A more detailed description of the whole weight-definition process can be found in Attachment II. The last chapter (3.4) is structured as a "user manual" for a correct understanding of the operation of the method: it contains instructions as well as specific definition of all the parameters that are separately presented for each step of the method, whereas a final discussion on the interpretation of the model results is provided at the end of the second and third step.

3.1 STRUCTURING THE METHOD

3.1.1 Overview of the Whole Procedure

The method that will be now presented is a whole procedure that should guide the user through the planning of a sustainable project of re-use, as well as recovery, refurbishment or preservation of a *historic building* – as defined earlier – and its closer environment – hereafter "site". As an operative method it is provided with two evaluation models that offer a rational support to its users – i.e. designers and decision-makers – in priority and alternative assessment when planning sustainable interventions.

The approach is based on current BSAMs, but in particular on the two models that were described in the previous section – the GBC HB and the Villas model. More precisely, the first has offered some interesting inputs for the criteria checklist of the sustainability tree, whereas the evaluation method at the base of both the vocationality and sustainability analyses was inspired by the Villas project.

The Whole Re-use Process

Starting from the belief that a correct re-use plan is not only a mere design project, the method is grounded on a wider consideration of the whole re-use process: each planning project should begin with a data collection of the building and its site in order to get an idea of the subject, of its potential values and criticalities (weaknesses). Once the situation is familiar, the designer should find out the most suitable new use by contemplating the state of the art at both the architectural and territorial scale as well as stakeholders' and people's expectations. Finally, according to the most appropriate purpose that has been identified, the designer is asked to draw up a project, which should though imagine execution, operation and maintenance difficulties that can also condition the sustainability and success level of his idea (Figure 4).

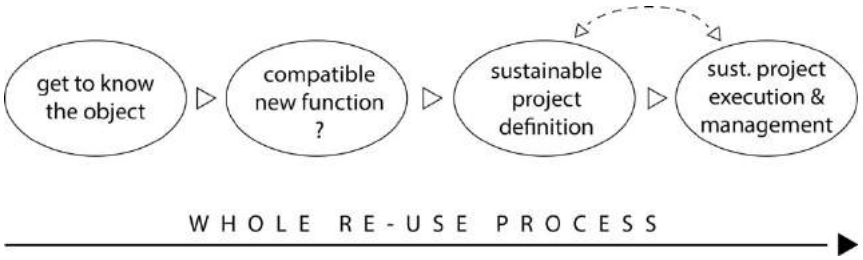


Figure 4: The Whole Re-use Process (Lombardi et al., 2015)

The Three-step Procedure

In order to cover the whole re-use/preservation process, the proposed method is divided into three parts:

- the knowing phase
- the vocationality analysis
- the sustainability analysis.

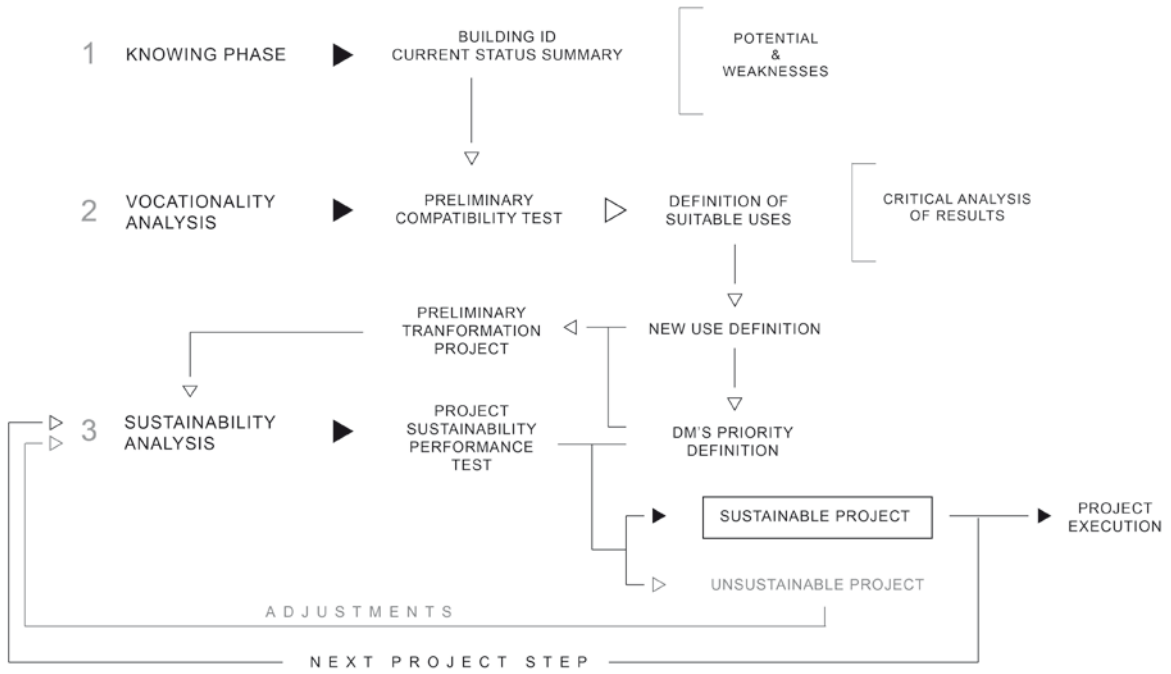


Figure 5: Method Flowchart

In the first one, the user is asked to gather some data about the building and the area, finding out their potential and values as well as weaknesses, which should then be considered in the project. Concretely, a sort of building ID form must be filled in, where all information and any appraisal of the building and its site qualities are gathered.

The other two steps are characterised by the aforementioned evaluation tool, that correlates existing parameters and project choices to a set of criteria, which are hierarchically organised according to the "Value Tree Analysis" [64]. In particular, the second phase – the "vocationality analysis" – focuses on the identification of a suitable new use. Villas model will be here improved with missing criteria and functional types, in order to be applicable to a wider range of buildings, meaning also that it will have to be completely reset. On the other hand, the last part – the "sustainability analysis" – shows preliminary project performance through a scoring system based on expert opinion. The sustainability criteria are here grouped in a tree structure merging into three macro-categories: socio-cultural, environmental and economic sustainability.

[64] The Value Tree Analysis is able to represent in a simple way a complex decision-making problem by summarising different criteria into a single aggregated criterion. The structure roots are the objective to pursue, that divides into several sub-problems or sub-criteria (Giove, 2006, p. 48).

3.1.2 Models and Parameter Definition

The Building Identity Card (ID)

The initial phase of collecting information about the building to re-use is of key importance for a successful operation: Ornelas et al. emphasise the importance of a correct assessment of the building characteristics before any intervention, as well as the relevance of assessing people's social needs and expectations (Ornelas et al., 2016), so that they can be reflected in the re-use project.

The knowing phase with its ID card enables the project team to get acquainted with the characteristics and values of the construction and its immediate environment, which is usually interpreted as its plot, but could be larger according to the influence of the building on the surroundings. It is essential to get detailed information about its history, in order to evaluate authenticity and to understand the meanings or values associated with that asset, that should be later respected by the new project[65]. With the aim of making the designer feel responsible about his or her task, he should fulfil a series of surveys: to begin with, a historical research enriched with a photographic report, followed by social interviews and analyses related to economic context, qualitative and quantitative appraisal of the building, its conservation status and performance in reference to regulatory compliance and versatility.

The user is therefore asked to fill in a few tables that will form a sort of building and site ID (Attachment IV). The first part gathers general information about location, cadastre, extent,[66] prescriptions deriving from the city plan or legal protection of the asset and ends with a recapitulation of its history. Within the context quality framework, landscape and site qualities are reported, as well as the type of economic context, accessibility and available services. Heritage awareness of the place is part of the social value, where also the historic, traditional, collective attachment and intangible merits – resulting, for instance, from surveys or discussions with local people – are enumerated. Other values concerning aesthetics, style, rarity, type or design, authorship, techniques and technology are appreciated under the architectural qualities. In case of registered buildings there is an optional part summarising preservation directives.

The following section of the ID is an elemental classification of the construction with system and material specifications in addition to the conservation status description and the first hypothesis on the diagnosis of the building. The user can here also provide quantitative data, in order to facilitate later bills of quantities and estimates.

ID Content Definition

The idea of guiding the analysis of a building through an ID preparation was suggested by the GBC HB protocol, whose model inspired the structure of the present ID card. As mentioned before, the GBC HB tool is designed for an application to solely protected buildings, which are usually older assets with special aesthetic features that are usually identified with decorative elements. For this reason, HB's ID does not consider an estimate of the value and quality of the property, but is rather composed of a general information part, a historic overview of the building and past interventions, and finally, a quantitative analysis of the building elements. However, since the present method should also deal with non listed buildings – which could however have particular features – an additional part was included here (appreciation of values), in order to fully understand the subject and its potential.

The content of this part was defined thanks to specific research conducted on the evaluation of modern architecture, which is nowadays, after losing a great number of masterpieces, finally gaining in importance as

[65] This phase is particularly important for those buildings that are not yet under protection, since it should prevent bad choices that might erase characterising qualities.
[66] Area, building type, height etc.

an element of heritage (Docomomo)[67]. The specific reference to modern architecture was selected because the assessment of such constructions represents a great challenge as it should suit various building types with new characteristics; as a consequence, it offers a more complete set of evaluation parameters, also including non-conventional features, e.g.: innovative design, authorship, technical value, collective attachment, etc. that might well express the qualities of recent constructions. Another interesting characteristic of such evaluation is that the various values are rather equally important,[68] which contributes to a more objective assessment and preservation of architecture.

In order to obtain a more complete list of evaluation criteria, Docomomo's Fiche[69] was studied and integrated with other documents – Charters and legislative body, from international to national and the local level:

International level:

- **ICOMOS** / ISC 20C (International Council for Monuments and Sites / International Scientific Committee for 20th Century Heritage): Approaches for the Conservation of Twentieth-Century Architectural Heritage, **Madrid Document, 2011**
- **RAIA** (Royal Australian Institute of Architects), Australia: **International Heritage Criteria, 2005**
- **TICCIH International** (The International Committee for the Conservation of the Industrial Heritage): **The Nizhny Tagil Charter for the Industrial Heritage, 2003**
- **UNESCO** WHC (United Nations Educational, Scientific and Cultural Organization - World Heritage Centre): **World Heritage List Criteria, 2005**
- **UNESCO** WHC (United Nations Educational, Scientific and Cultural Organization - World Heritage Centre): **Operational Guidelines for the Implementation of the World Heritage Convention, 2013**

National level:

- **Australia ICOMOS**: **The Burra Charter** (Practice Note), **2014**
- **United Kingdom Government** – DCMS (Department for Culture, Media and Sport): **Principles of Selection for Listing Buildings, 2010**
- **UK EH** (English Heritage): **Conservation Principles: Policies and Guidance for the Sustainable Management of the Historic Environment, 2008**

Local (or regional) level:

- **Australia NSW HO** (New South Wales, Heritage Office): **NSW Heritage Manual – Assessing Heritage Significance,2001**
- **Australia NSW HC** (New South Wales, Heritage Council): **Heritage Act 1977 – Criteria for Listing on the State Heritage Register**
- **Australia Victoria HCV** (Heritage Council Victoria): **Heritage Council Criteria for the Assessment of Cultural Heritage Significance** – Information Note**,2008**
- **Australia Victoria HCV** (Heritage Council Victoria): Assessing the Cultural Heritage Significance of Places and Objects for Possible State Heritage Listing: **The Victorian Heritage Register: Criteria and Threshold Guidelines,2012**
- **Australia Queensland Government – Department of Environment and Heritage Protection**: **Assessing cultural heritage significance: Using the cultural heritage criteria** – Guideline, **2013**
- **USA Docomomo WEWA** (Western Washington): **Historic Designation**, **2014**

[67] 'In recent decades, the architectural heritage of the modern movement has appeared more at risk than during any other period. (...) At the end of the 1980s, many modern masterpieces had already been demolished or had changed beyond recognition. This was mainly due to the fact that many were not considered to be elements of heritage, that their original functions have substantially changed and that their technological innovations have not always endured long-term stresses.' (from Docomomo's Mission website)

[68] In the past great importance was given to aesthetic.

[69] Docomomo's Fiche represents an internationally recognised example of cataloguing (documentation) and the format provided resembles an ID, where the values of the building must be analysed and described.

All the criteria that have been declared or that have been deduced from the above mentioned documents were then summarised in the "Table of Evaluation criteria for modern architecture" (Table 4). This articulate overview was eventually summarised in a selection of grouped values[70] that complete the first part of the building ID (see: A_IV.1). Possible qualities are listed as sub-elements of the grouped values or are specified in their description.

Observations

According to the analysis of the above listed documents, architectural heritage is generally appreciated for (in alphabetical order):

- aesthetic qualities
- historic association with the past that can help understanding cultural development in general
- innovational aspects – also in relation to technology
- rarity – intended as degree of uniqueness or possession of uncommon qualities
- social value in relation to community associations
- spiritual meanings

These are in fact the most recurring parameters, but some documents also include additional criteria, important to identify other qualities that might render a building or site worthy of being registered as cultural heritage for people. For instance, interior quality (furniture included) and the presence of artworks have been mentioned only in ICOMOS's Madrid Document[71]. An other frequently overlooked value comes from the building location, which can positively influence the subject for its environmental qualities as well as for the particular setting derived from the author's design concept.

Looking at aesthetic significance – which is one of the most accepted, though not necessarily the most important – it is interesting to notice that only a few sources define its indicators, while most of the documents do not specify their interpretation of "aesthetic qualities". In addition, it is intriguing to note how the Burra Charter and, consequently, Australian regional principles (AUS Queensland) extend the aesthetic significance also to non visual aspects (smell/scents, sounds, texture, etc.).

The first impression can lead to the conclusion that the Burra Charter is one of the most complete documents; however, upon closer inspection it also lacks some important indicators that are included in other documents. Probably none of the tools are perfect but all are likely to successfully recognise and evaluate cultural heritage.

[70] Groups of values, or better the types of values that were finally considered are: context quality, social value and architectural quality.
[71] Nevertheless, the container perfectly fitting the content (and vice versa), giving sense to each other, is a highly appreciated quality. If not taken in consideration, the particular relation between two elements might depreciate both of them.

SIGNIFICANCE	VALUE	INDICATORS	INTERNATIONAL LEVEL					NATIONAL LEVEL			LOCAL LEVEL			
			DOCOMO intl	ICOMOS madrid	RAIA aus-intl	TICCIH intl	UNESCO	AUS_Burra charter	UK_gov	UK_EH	AUS_NSW_HO	AUS_VICT_HCV	AUS_QUEENSLAND	USA_DOCOMOMO_WEWA
			1	2	3	4	5	6	7	8	9	10	11	12
AESTHETIC	**artistic - archaeological value** *contribution of artistic content or significant interior aspects to the heritage value of the building / site*	contains artworks		X										
		design quality of furniture		X										
		design quality of interiors		X										
	formal strategy & quality value *refers to the sensory and perceptual experience of a place, including both visual (*) and non visual (**) aspects, that usually derive from compositional and attractive qualities of the place itself*	*aesthetic quality (overall)*	X	X	X	X			X	X	X	X		X
		circulation								X				
		colour*		X				X					X	
		contrast*											X	
		decoration*							X	X				
		detailing*						X		X				
		feel**											X	
		form / silhouette*								X			X	
		massing*						X		X				
		material / planting*		X						X			X	
		movement*						X						
		proportions								X				
		relationship between components / unity*						X					X	X
		scale*											X	
		sense of beauty*											X	
		sense of place**											X	
		smell / scents**						X					X	
		sounds						X					X	
		spaces / views / vistas						X		X				
		taste**											X	
		texture*						X					X	
		touch**											X	
	inspirational - symbolic value *includes factors that have a strong impact on human thoughts, feelings, attitudes, activity*	inspires work in different cultural fields (art/press/literature/mythology etc.)					o	X						
		evocativeness						X					X	
		expressiveness											X	
		picturesqueness											X	
	site value *contribution of context to the significance of a heritage site*	referring to physical location can be appraised: *(overall)*		X			X		X					
		landscape quality / frame		X										
		setting: distinctive within the setting - landmark presence		X		X		X					X	
	stylistic value *architectural works which are examples of a particular style or period of architectural development and have been designed at the time of the particular period*	demonstrates principal characteristics of a particular class / period of style	o		X		X	X					X	
ARCHITECTURAL	**author value** *importance of an object/site as a product or part of life/work of a notable architect or group of designers*	association with life / work of an important person / group of architects			X					X				X
	design value *architectural works which have a high professional appeal, are part of a respectful programme, are held in high esteem or present a significant design solution - even if not a model to emulate*	significant plant form / planning schemes / concept		X		X			X					
		association with an intellectual programme	X							X				
		appreciation in press (specialized publications)	X											
		legion of merit (awards and nominations)												
	innovation value *architectural works which are masterpieces of human creative genius or demonstrate an innovative approach and have had an impact on architectural design*	demonstrates creative genius and achievement /significance in pattern & evolution / impact on design practice (also new typology, pioneering examples and prototypes)	X	X	X	X	X	X		X	X	X	X	
	reference / derivation value *relationship between the building / site under consideration and others which were built or established before in the same region or foreign countries*	association with other important works / examples (choice of sources) in reference to: *(overall)*	X							X				
		technical aspects	X											
		functional aspects	X											
		formal aspects	X											

SIGNIFICANCE	VALUE	INDICATORS		INTERNATIONAL LEVEL					NATIONAL LEVEL			LOCAL LEVEL			
				DOCOMO MO intl	ICOMOS madrid	RAIA aus-intl	TICCIH intl	UNESCO	AUS_Burra charter	UK_gov	UK_EH	AUS_NSW_HO	AUS_VICT_HCV	AUS_QUEENSLAND	USA_DOCOMOMO_WEWA
				1	2	3	4	5	6	7	8	9	10	11	12
HISTORIC	**associative-evidential value** *yields or has potential to yield information about past and cultural history ask for: is the product of / is an example of / was influenced by / has influenced / is associated with / has a symbolic ass. with / is the site of*	association with important:	activity				X		X					X	o
			event					X	X		X			X	X
			ideas	X				X							
			movement	X					X		X			X	o
			person / group						X	X	X	X	X	X	X
			period												o
			phase						X					X	o
			process	X										X	o
			way of life / living traditions					X						X	
		evidence (on local – state – regional / national / international level) in association with the history of:	aesthetics						X	o	X	o	o		o
			art & architecture			X		X	X	o	X	o	o		o
			economy							X	o		o		
			environment					X			o	X	o	X	o
			military							X					
			science						X	o	o	o	o		o
			society						X	o	X	o	o	X	o
			spirituality						X	o	o	o	o		o
	integrity value *measure of the wholeness and intactness of the cultural heritage and its attributes*	condition, degree of intactness/ integrity							X		X				
	typological / traditional value *exhibits important features of a cultural tradition or is a distinctive example of a type of building associated to a cultural area*	demonstrates principal characteristics of a class of cultural objects or places						X				X	X		X
SCIENTIFIC	**rarity value** *in terms of survival of particular aspects or in relation to the characteristic of uniqueness*	demonstrates uncommon / rare/ endangered aspects or is itself a special case					X		X	X		X		X	
	representativeness value *on comparison with similar cases the place demonstrates higher potential to yield important information about cultural history or is an exceptional testimony of it*	degree of contribution of further substantial information							X					X	
		stands out among similar examples (comparative analysis - selectivity)							X	X				X	
	quality value *ability to reveal more about an aspect of the past or in reference to the qualities generated by a conscious design or derived from precision execution and craftsmanship*	importance of data involved, potential contribution of further substantial information							X					X	
		quality of execution / design / craftsmanship					X			X	X				
SOCIAL	**collective attachment value** *perceived meanings by the community in relation to their political, national or other cultural sentiment*	local marker / symbol							X		X				
		meanings derived from use / association (emotional links)		X	X				X		X	X	X	X	
		source of identity, sense of community, social coherence and interaction					X		X		X	X	X	X	
	commemorative value *yields evidence of past human skills and activities which illustrate the evolution of a cultural identity*	repository of traditional knowledge / practices / art						X	X		X				
	spiritual value *refers to the intangible values and meanings embodied in or evoked by a place which give it importance in the spiritual realm*	importance to community beliefs, religion, spiritual practice and sentiment			X			X	X		x	X	X	X	
TECHNICAL / TECHNOLOGICAL	**practice value** *demonstrates principal characteristics, elements or practices of a particular period in reference to the technical and technological sphere*	building materials		X										O	
		building methods		X				o						O	X
		construction system			X		X	o						O	
		engineering					X								
		finishes		X										O	
		structure		X										O	
		technology						X						X	
	t. equipment value *contribution of special equipment, services and fittings to the technical appreciation of the building/site*	technical equipment (ie. machinery and components), services and fittings		X	X		X								
	t. innovation value *innovatory aspects related to the technical / technological testing ground*	new building materials and finishes		X				X	X	X	X	X	X	X	
		new solutions: schemes, structure, elements, methods, system, technology)		X				X	X	X	X	X	X	X	

Presence of values in listed documents is marked with an "x" if the parameter is explicitly considered, while “o” indicates a general consideration of the element.

The Vocationality Tree

The second phase is represented by the so called "vocationality analysis", which tries to determine the most suitable new use for the building and its site (hereafter: B&S) on the basis of the current situation of the B&S and considering its wider context (territory) as well. These two levels respectively assess the compatibility of the asset and the potentialities offered by the environment.

'Buildings are not just conserved for posterity and their survival relies on them having a relevant new use. (...) Time has proven that there is a viable new use for most buildings (...) and it is often a case of finding uses and occupiers that suit the type and style of building' (Orbasli, 2009, p. 5). However, if the proposed intervention outweighs the character and value of the building, both in terms of physical incompatibility or unsustainable cost of restoration and maintenance, then it probably is not the most appropriate new use for that building (Orbasli, 2009; Galli & Lioce, 2006). Nevertheless, finding a solution that respects the nature of the construction may not be enough. An effective economic re-use should also be pursued, in order to guarantee economic feasibility with long-term benefits, which might lead to an "active preservation" of the asset (Dallavalle et al., 2006 a). This means that a solid activity could bring, in the best case, to a self-financing project.

With the term "vocationality" a group of economists working on the issue of re-using historic manors (Villas Project) defined the propensity of a building to accommodate a certain new use according to cultural-historic and economic factors. Vocationality analysis, which is here proposed as the second step of the method, owes a lot to the Villas tool, not only for the evaluation procedure, but also for some criteria that are proposed again here. However, the biggest difference between them is in the number of parameters and possible uses: in the Villas case the problem was narrower, since all the buildings belonged to the same type and period[72]; therefore, the criteria were more subject-specific and the options limited to three possibilities: residential, accommodation or office.

Provided that the present method should be applicable to a wide variety of constructions, vocationality analysis should consider a wide range of potential functions that should however be grouped into a reasonable number of alternatives. When considering only one building, as in the case of Palazzo Artelli (Ognjanovic, 2012-2013), it is rather easy to assume many and well-defined uses, but in wider tasks it is indispensable to limit the categories from a less clear, but comprehensive selection of them.

In order to maintain a manageable number of alternatives, purposes have been grouped, according to their common requirements or standards, into five possibilities:

- **RES** **RESIDENTIAL**: houses, apartments, etc.
- **PRO** **PRODUCTION**: small factories, artisan, distribution and logistic activities (or shopping centres)
- **ACC** **ACCOMMODATION**: hotels, B&B, hostels, residence halls, etc
- **C&A** **COMMERCIAL & ADMINISTRATION**: public or private offices and retail
- **PUB** **PUBLIC**: cultural, educational, sport services, etc.

Each of them refers to the tree structure of criteria that consider qualities of the territory – i.e.: landscape, built environment, accessibility and transport – economic context and qualities as well as versatility of the building and its site, as for instance: space efficiency and flexibility, regulatory restraints, open-space opportunities, etc. (Figure 6). The user examines the situation and fills in the assessment table of all criteria, whereas the evaluation model calculates the compatibility on the basis of some pre-registered weights that derive from an expert-based team evaluation[73] (see: chapter 3.3 and attachments: II.1 and II.2): for each group of purpose the preference/suitability can eventually be viewed as a 0-1 rating (see: interpretation of results in chapter 3.4.2).

This evaluation procedure is certainly indicative: it should help DMs to consider a variety of aspects involved in a feasible solution, but it is not sufficient, since it only provides a suggestion of a purpose-area rather than a

[72] I.e.: Venetian Villas (15th – 19th Century) mostly built during the 16th Century and later rearranged or enlarged.

[73] A group of experts has been asked to assess the importance of the listed criteria in reference to each purpose group, in order to determine weights for the model algorithm.

specific function; secondly, it does not consider stakeholders' ambitions, while it can offer a neutral point of view. So, the user should also collect the opinion of different stakeholders[74], what not only guarantees public participation and therefore social sustainability, but could also provide a more specific idea for the new use of the asset.

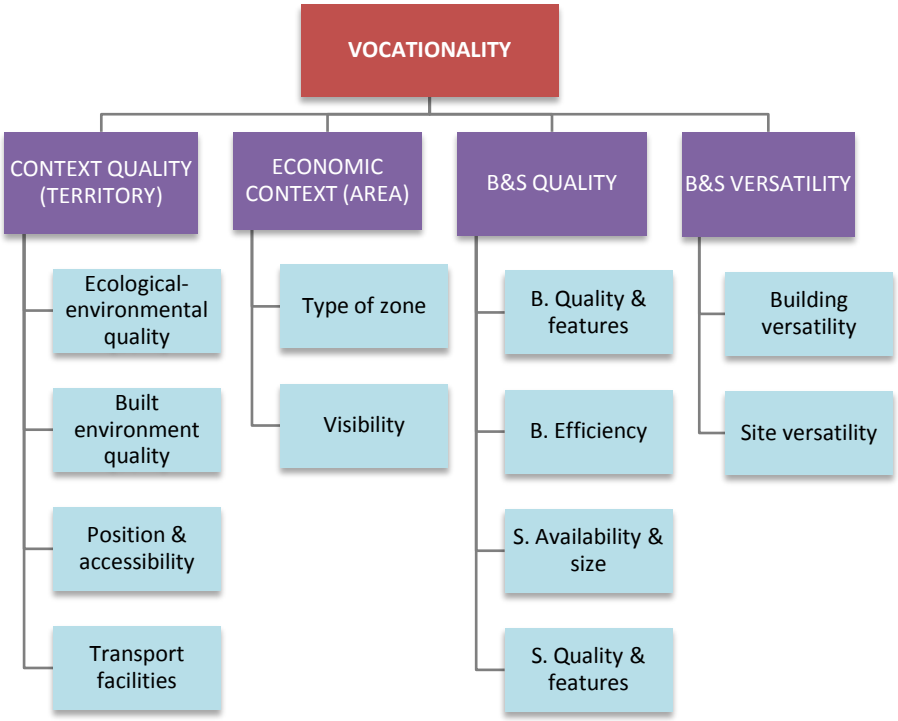


Figure 6: Vocationality Tree

Parameter Selection

The criteria selection and organisation for this part have been gathered mainly from the Villas Vocationality layout, as most BSAMs start their evaluation at a later stage of the design process, when the use and occupancies had already been set. The listed parameters have also been integrated with some suggestions from a feasibility study promoted by ZVKDS OE NG for the refurbishment of Vipolže Castle (ITEO Svetovanje d.o.o., 2006). Some other have been derived from the "Market Analysis for Valuation Appraisal" by Fanning, Grissom and Pearson, where main characteristics for shopping centres (commercial use), office buildings, apartment complex and vacant land have been deduced from the corresponding market analysis applications (Fanning et al., 1995).

Finally, many criteria have been added on the basis of personal knowledge with two different approaches. At first, potential and important features of different buildings in disuse from the transborder territory have been listed. Afterwards, requisites and important factors have been noted down for each of the aforementioned uses and the collected information summarised with suitable parameters.

Next, several tests on study cases have been run to see whether the criteria were actually significant or not and to find an effective organisation in the tree structure. The tree and its components have been finally chosen and rearranged during the survey for the definition of weights: with the help of participants, some features turned out to be equally important to all the considered uses, so, since their contribution would not be effective, they have been removed.

At this point another problem arose with the criteria specification (4th level of the tree structure) which led to a more accurate categorisation of the possible status of a certain parameter: since there are also some

[74] E.g.: owners, managers, authorities, citizens, promoters, etc.

alternatives which exclude each other and cannot coexist[75] – which is in contrast with the evaluation method that has the advantage of considering interaction among criteria as well – a distinction between the different nature of criteria – "complementary" (excluding) or "optional" (coexisting) – had to be undertaken. The parameters were therefore divided into two columns and the "complementary" elements were inserted in a drop-down menu, so that the model would automatically pick the weights assigned only to the selected feature. On the other hand, optional features, which can exist contemporarily, are chosen by the user (from none to all) and the model processes them considering all the weights assigned to the selected items.

The Sustainability Tree

Once the new use is chosen and the preliminary project is drawn up accordingly, the user can test it with the "sustainability model" to get an idea of the sustainability level of his solution. Of course, the model is not deterministic – it does not provide an accurate and universally valid assessment, rather it represents a starting point for observation and interpretation. The aim is not to certify a project, but to encourage designers and DMs to consider various aspects in order to define a balanced solution among different sustainability actions that should be chosen by the user in relation to the specificity of the case. As a consequence, the balanced solution is not provided by the tool itself, but should be found by the user with the help of the sustainability model, on the basis of a correct understanding of the weak and strong points of the subject and by defining a priority list of goals to pursue.

Similarly to the previous phase, the third part is also provided with a hierarchically organised list of criteria (Figure 7), which are here divided into four levels. Starting with the three pillars of sustainability belonging to the "macro-category" level, the socio-cultural, the environmental and the economic sustainabilities find a further specification on the "category" level, followed by the "aspect" and the "options & alternatives" levels (Lombardi et al., 2015 a). After several attempts at configuration, the definitive version counts 69 criteria in the fourth level, referring to 21 aspects and 10 categories. The high number of parameters could still seem uncontrollable and the method too complicated; anyway, the SBTool with over 191 criteria has proven to be both a usable and reliable tool. Furthermore, input values of the present model do not require previous calculation with different (specific) software as in certain BSAMs – this indeed aims to simplify the assessment procedure.

On the other hand, a survey was carried out in October – December 2015 to verify the importance, or better, the influence of the initial 113 criteria on sustainability matter as perceived by professionals, in order to see whether some could be omitted. The results showed that none of the listed parameters was negligible, since the minimum score was 70/120, whereas over 90% of them achieved between 80 and 103/120 points (see: Attachment II.4). Despite this, the model was simplified as much as possible, so that the parameters were merged and grouped into a narrower structure.

Finally, the first macro-category is socio-cultural sustainability, which is represented by: the "process quality", the "cultural heritage" and the "user comfort & perception" which consider public participation, respect for the building character and the comfort of end-users. The environmental sustainability area evaluates the energy efficiency, the ecological impact of pollution, materials and technologies, the construction site management and the environmental quality, which concerns in particular green areas, transport and effects on neighbourhoods. Economic sustainability deals with the cost coverage along the entire lifespan of a building, in addition to expected incomes, riskiness of the investment and related benefits or externalities for the community. Analysed BSAMs usually consider only life cycle costing, whereas the Villas' parameters – financeability, profitability, risk and operating cost coverage – have been here integrated with non-monetary, positive externalities that are part of the "utility" parameter.

[75] As a case in point, let's consider the position parameter: a building can be located in the urban centre OR at the city/town edge OR in a suburban context. Since the three possibilities together are incompatible, one should be selected first and the others automatically ignored.

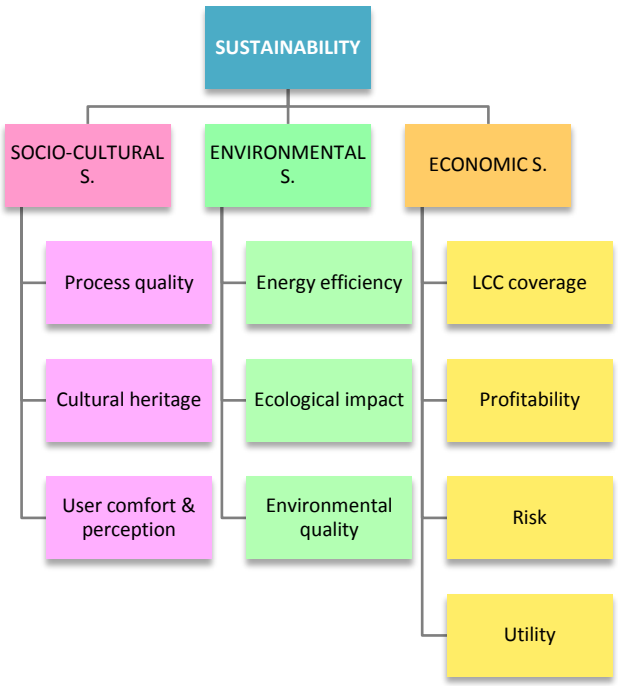


Figure 7: Sustainability Tree

Criteria Definition

As previously stated, the definition of the sustainability tree was integrated and reshaped several times. A draft version of parameters was prepared on the basis of the Villas model and the GBC HB tool. The list of criteria was then enhanced thanks to the BSAMs analysis, which expanded the model to its maximum number of elements which were later necessarily summarised and reorganised.

Some criteria that were included first – for instance "water quality" – have been deleted because they were not particularly relevant for the territory of Gorizia and Nova Gorica – the reference zone for the whole research project. On one hand, repetition of similar criteria, though with slightly different connotation, was avoided by grouping or merging parameters together. On the other hand, the organisation of the tree structure was strongly influenced by the particular evaluation method adopted (see Chapter 3.2), which limited the number of sub-elements within a group to 5 entries: it is, in fact, it demonstrated that the evaluator can manage up to 5 parameters at the time without compromising the quality of the judgement (Giove, 2006).

On the contrary, the economic domain was initially defined considering the results of two different literature reviews: the first tried to find out how sustainability affects economic aspects and how such aspects are measured and quantified; the second was more directly related to economic sustainability in architecture. Outcomes from both studies addressed interconnected issues that are mainly referable to the four parameters that had already been taken into account in the Villas model. So, the expanded version of this part was again reduced to four elements, yet enriched with the utility component.

3.2 EVALUATION PRINCIPLES

3.2.1 Introducing MCDA

MCDM Problems

'Multiple Criteria Decision-Making (MCDM) can be perceived as a process of evaluating real-world situations based on various qualitative/quantitative criteria in certain/uncertain/risky environments in order to find a suitable course of action/choice/strategy/policy among several available options' (Raju & Kumar, 2013, p. 343).[76]

Therefore, MCDM is the decision-making in the presence of multiple, usually conflicting, criteria. Such decisions are very common in everyday life – for instance a car or a house purchase – but are even more frequent in a business context, where problems are also more complicated and of a larger scale. Despite this, the history of MCDM discipline and methods is relatively recent, since it was established in the 1950s – 60s, along with the development of computer technology (Zavadskas et al., 2014; Xu & Jian-Bo, 2001; Hwang & Yoon, 1981).

There are several types of MCDM problems, divided mainly into two groups: the first is represented by MC Evaluation Problems, which have a finite number of alternatives and whose goal is to find the best alternative or set of alternatives. These problems are also known as "discrete MCDM" or "discrete MADM" (Multi-attribute Decision-Making). The second are MC Design Problems, where alternatives are non-predetermined and the aim of the problem under consideration is to design the best/optimal alternative by considering a set of well-defined design constraints, a set of quantifiable objectives. Such problems, having an infinite number of alternatives, are more complex and lead to MODM (Multi-Objective Decision-Making) and Multiple-Objective Mathematical Programming (MOMP), where the main task is optimisation of multiple objectives (Zavadskas et al., 2014; Xu & Jian-Bo, 2001; Hwang & Yoon, 1981).

Even if discrete MCDM can concern very different application areas, some common features can though be observed (Xu & Jian-Bo, 2001):

- hierarchy of multiple attributes[77] and criteria – attributes break down into lower levels – sub-attributes;
- conflict among criteria – opposing criteria that cannot be satisfied at the same time;
- hybrid nature – incommensurable units, mix of quantitative and qualitative attributes, deterministic and probabilistic (random) attributes;
- uncertainty – due to subjective judgements, incomplete information or lack of data;
- large scale – numerous attributes, up to several hundred;
- assessment may not be conclusive – due to aforementioned uncertainty and subjectivity there might not be a unique solution (ideal s., non dominated s., satisfying s., preferred s.).

MCDM Methods

MC Analysis tools are used as a support for comparison of different options with reference to a set of criteria. MCA tools 'are very effective in supporting the assessment of and decision making on complex issues', as for example on sustainability development, 'because they can integrate a diversity of criteria in a multidimensional guise and they can be adapted to a large variety of contexts' (van Herwijnen, 2016 a, p. 1).

[76] Cited in Zavadskas, Turskis, & Kildiene, 2014.

[77] An attribute is a property, quality or feature of the considered alternatives. The words attribute and criterion are often used interchangeably.

In the literature several hundreds of approaches can be found and are still increasing exponentially, often combining previous tools into new approaches, leading to small variations, yet encouraging new branches of research (Velasquez & Hester, 2013; Liou & Tzeng, 2012).

Methods are generally distinguished through the decision rule, which can be compensatory or non-compensatory (Figure 8), where compensability refers to the possibility of compensating the lower performance of a criterion with the better performance of another criterion (van Herwijnen, 2016 a). Due to continuous development in the field and to the wide number of features, several classifications of MADM methods are possible (Liou & Tzeng, 2012; DCLG, 2009; Zavadskas et al., 1994), nevertheless, authors still look at Hwang & Yoon's classification from 1981 as one of the most effective and systematic. Hereunder is reported their classification of MADM and MODM as published in their book (Figure 8 and 9) and an additional one that was reconstructed according to their description (Figure 10).

The following figure is another possible classification that was deduced from the literature consulted and reports only the most popular methods (Figure 11). It is not meant to provide a complete overview of available tools, but rather locates the particular method that is used in the present method – MAVT: Villas Model – that will be presented further.

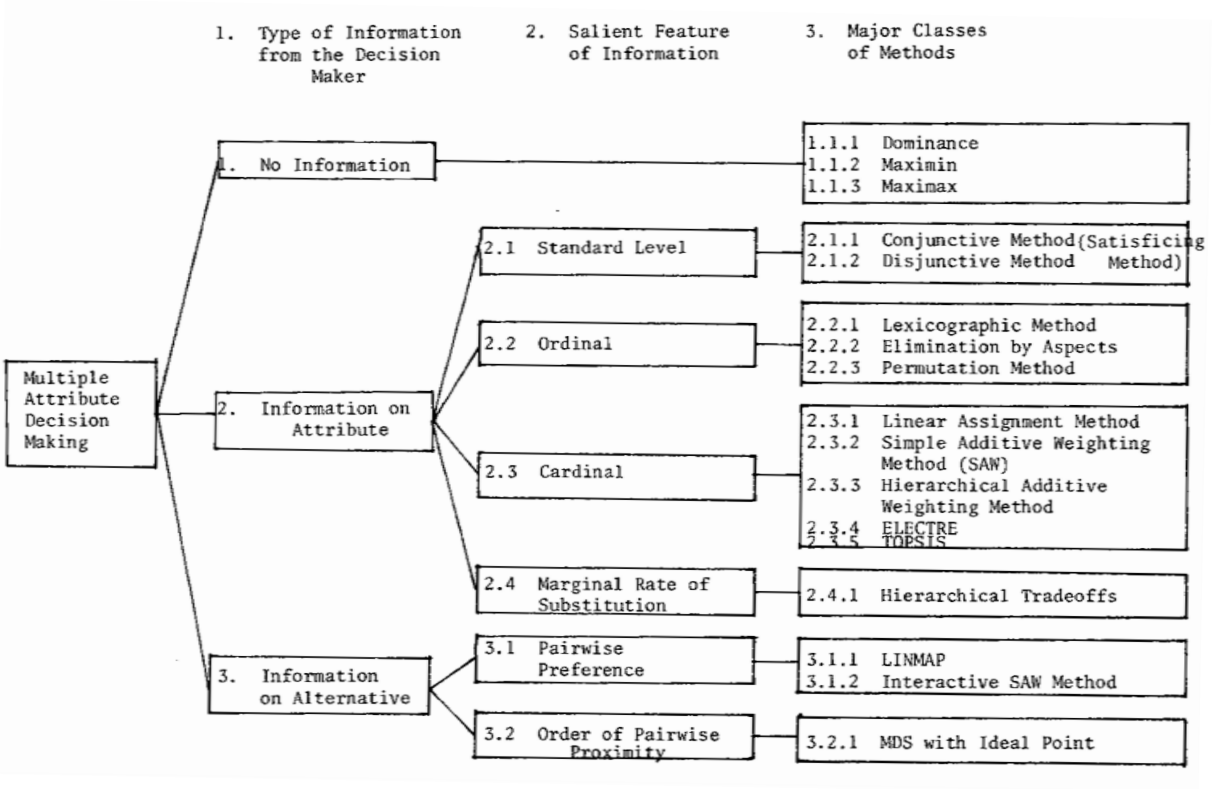


Figure 8: A Taxonomy of Methods for MADM (Hwang & Yoon, 1981, p. 9)

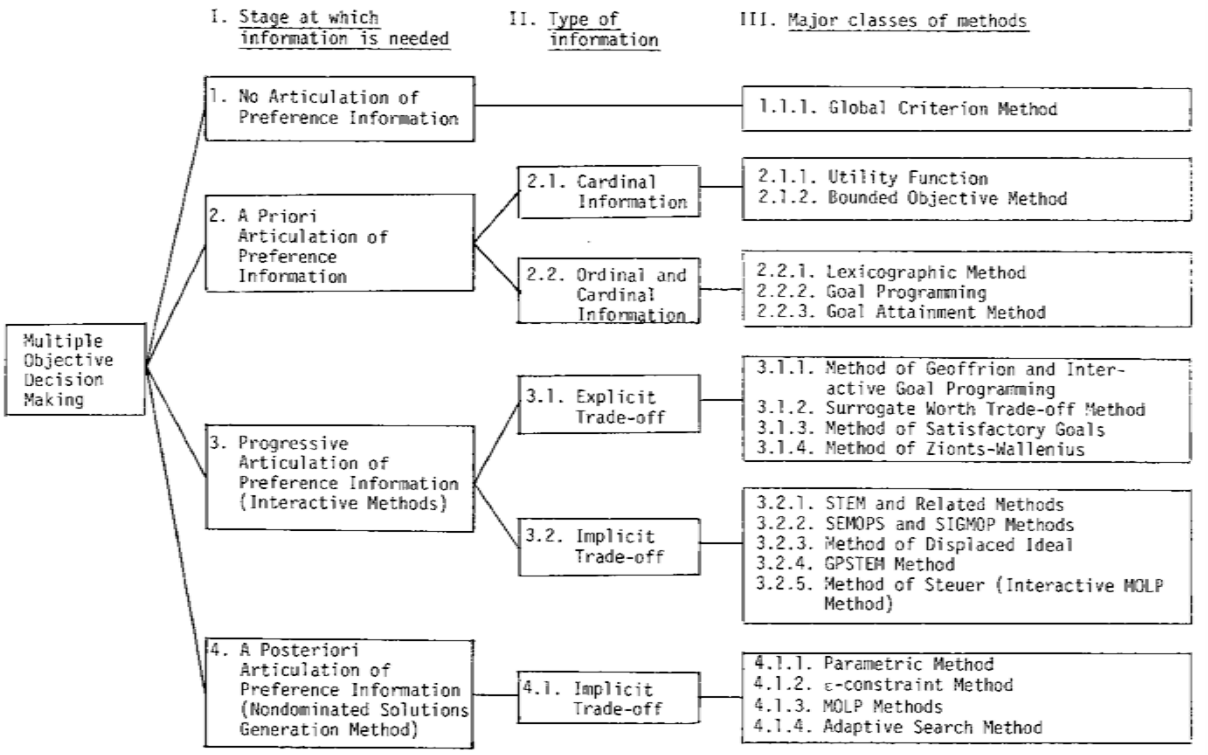


Figure 9: A Taxonomy of Methods for MODM (Hwang & Yoon, 1981, p. 209)

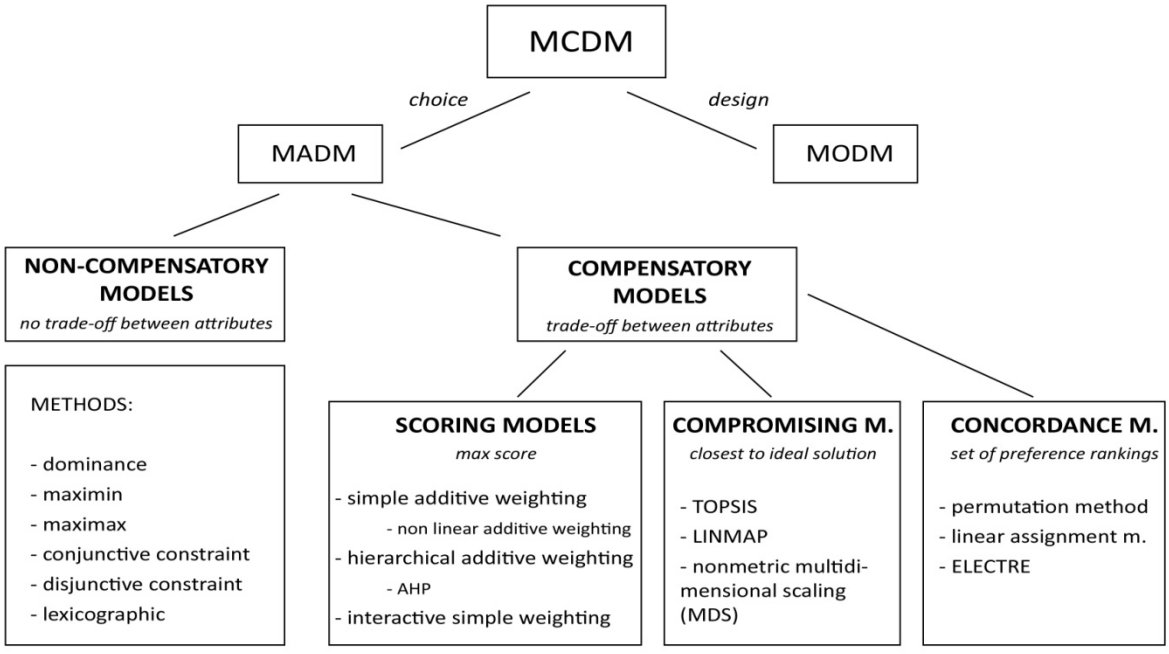


Figure 10: MCDM Classification Deduced from Hwang & Yoon's Description (1981, pp. 24-25)

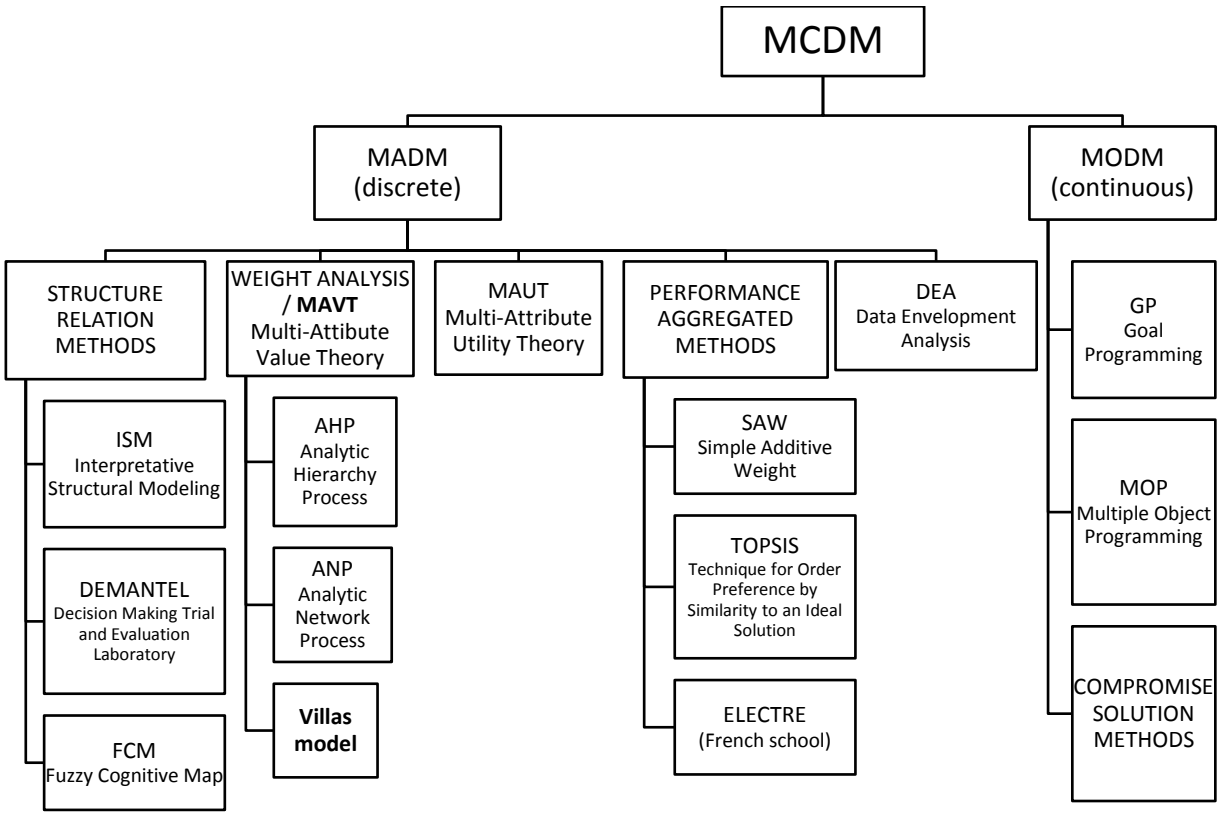


Figure 11: Classification of MCDM Methods According to J.J.H. Liou, G.-H. Tzeng (2012)

3.2.2 The Method Adopted: the Villas Model

Overview and MAVT Framework

The evaluation model at the basis of the second and third part of the present method is derived from the Villas model. This particular evaluation method, which had been previously adopted for the sustainability assessment of historic manors re-use, is a multi-criteria (MC) analysis derived from the Multi-Attribute Value Theory (MAVT), a compensatory technique among MADM methods.

According to van Herwijnen, MAVT 'provides a structured approach to complex problem solution and it accommodates various types of information – quantitative as well as qualitative; it enhances the understanding of the policy problem by forcing the decision-makers to compose a value function that represents their preferences; it provides a means of communication for reasoning and negotiations by clarifying the strengths and weaknesses of the alternative policies and by the possibility to clearly visualise and communicate the intermediate and final results; can incorporate the diverse views of stakeholder groups to construct the criteria tree, to develop alternative options/solutions for the problem and to compose the value function.' (van Herwijnen, 2016 b, p. 4)

MAVT addresses problems with a discrete set of alternative policies that have to be evaluated with regard to conflicting objectives. For any objective, there is one or more attributes (or criteria), that measure, often using different measurement units, the performance in relation to that objective. The options' performance is then aggregated across all the criteria to form an overall assessment, which aims to provide a preference order on the alternatives consistent with the DM value judgements. The preferences of DMs are here represented by a value function, which is used to transform the attributes of each alternative policy into one single value, so that the highest value points out the best alternative (van Herwijnen, 2016 b).

The function value or the method of score aggregation can be a simple additive form or it can assume also interaction among the considered elements. Considering that 'in reality, the evaluation criteria are seldom independent, and the relationships between them are frequently characterised by a degree of interactivity, interdependence and feedback effects' (Liou & Tzeng, 2012, p. 677), a non-additive form is preferable and more realistic, though more complicated, time-consuming in addition to the expertise requested (van Herwijnen, 2016 b). This explains, why other MAVT methods, such as additive modelling and weighting by AHP (Analytic Hierarchy Process)[78], are more common – especially among non-economists[79].

On the contrary, the Villas model, which is here adopted, is based on non-additive measures (hereafter: NAM), so it has the advantage of considering also interactions among subsets of criteria, becoming, therefore, one of the most appreciated mathematical tools (Giove et al., 2011). Moreover, it was chosen for its reliability and past application on different study cases, which demonstrated that it is 'a valuable and increasingly widely-used tool to aid Decision-making in the domain of sustainability assessment and urban and territorial planning, where a complex and inter-connected range of environmental, social and economic issues must be taken into consideration and where objectives are often competing, making trade-offs unavoidable' (Ferretti et al., 2014, p. 2).

The Multi-linear Operator Approach

The approach proposed by the Villas model (Giove, 2006) is a rating method that tries to provide a scoring for each solution – in the vocationality analysis it refers to each possible use, whereas in the sustainability analysis it rates the project proposals. The rating derives from a function value that depends on values of criteria, which must be evaluable/measurable and expressed on a common scale – in this case either qualitative or quantitative judgements provided by the user are normalised on a range 0-1. The final score is again within the same range, so that the obtained performance can easily be compared with an ideal situation (=1), which is however impossible. The scoring is calculated as follows:

$$V(i) = F(c_1(i), c_2(i), \dots, c_n(i))$$

where:

V(i) = scoring of a certain alternative (solution)
(C_1(i), ... c_n(i)) = values of the n-criteria associated to the alternative "i"

The formula contains two sets of data: the first are weights[80] that were defined by experts/stakeholders thanks to several questionnaires (see following chapter and Attachment II) and that are used to define the function value F; the second is the value expressed by the user that describes the feature of the subject he or she is dealing with (vocationality a.) or the performance of his project proposal (sustainability a.) in reference to the description of the criteria. The formula is applied bottom-up to each node and level of the considered tree structure (vocationality or sustainability tree), with a different and specific value function for each node.

The innovative aspect of the Villas model lies in the algorithm that aggregates the scores: it is an extension of the classical weighted summation that though considers not only the linear combination of criteria values, but also the mutual effects arising from the product of sub-groups of possible variables. This means that weights are not only assigned to a single criterion, but to their coalitions as well – i.e. to all possible combinations – in order to improve (super-additive/synergetic effects) or penalise the scoring (sub-additive/redundancy effects)

[78] AHP is a simple additive model, where weights are determined on the basis of a paired comparison of criteria (Velasquez & Hester, 2013; Mohindru, 2011).
[79] In the literature, sustainability development methodologies often prefer AHP due to a simpler and more transparent procedure. A recent example of this is Markelj's "A Simplified Method for Evaluating Building Sustainability in the Early Design Phase for Architects" (Markelj et al., 2014)
[80] A weight is the relative importance of a criterion and indicates the priority assigned to the criterion by the DM while ranking the alternatives in a MCDM environment. (Mohindru, 2011)

(Giove et al., 2011). As a consequence, the aggregation form is not a simple weighted summation, but a more sophisticated approach, grounded on a multi-linear evaluation and non-additive measures (NAM), that are here the normalised weights provided by the questionnaire participants (Giove, 2006).

An example of score aggregation on an edge (representing criterion i) with three sub-criteria (A, B, C) is:

$$V(i) = w_A v_A + \ w_B v_B + \ w_C v_C + w_{A,B} v_A v_B + \ w_{A,C} v_A v_C + \ w_{B,C} v_B v_C + w_{A,B,C} v_A v_B v_C$$

where:

V(i) = value or total score obtained by criterion i, which is divided into 3 sub-criteria
w_A = weight/importance of criterion A
$w_{A,B}$ = weight as defined by the expert for the simultaneous presence of criterion A and B
v_A = value expressed by the user in reference to criterion A

Since the method considers all possible combinations of criteria of the same subset, it is important to limit as much as possible the number of sub-elements when structuring the tree of criteria. Given that for n criteria there are 2^n possible coalitions, it is recommended that sets have at maximum 5 or 6 criteria (Giove, 2006) or it would be difficult for the experts to provide consistent judgements.

3.3 WEIGHT DETERMINATION THROUGH SURVEY

3.3.1 Approach and Participants

All the weights for both evaluation models – the vocationality analysis and the sustainability analysis – were defined through specific questionnaires that were addressed to different participants involved in the re-use process of a building and its site (hereafter: b&s). More specifically, these decision-makers are represented by experts (designers: architects, urbanists, engineers, etc. or specific professionals: economists, ecologists) or stakeholders (public administrators, investors, citizens), who were consulted for different parts/areas, as shown in Table 5. Since the vocationality analysis has a greater bond with the territory – here the study area of Gorizia and Nova Gorica – than the sustainability part, people from this region were interviewed for the definition of vocationality priorities, offering a "local" and "participated" approach to the present work. On the contrary, sustainability parameters are based on the contribution of Italians, Slovenians and foreigners with certain knowledge or experiences in sustainability. In total, approximately 100 persons were involved in the surveys.

For both the vocationality and the sustainability model, two separate methods (and questionnaires) were adopted:

A) the definition of weights for the first two levels of the tree structure (for both vocationality and sustainability trees) followed the Villas' "**method of edges**";

B) weights of sub-criteria from the lowest level of specification of the vocationality and sustainability tree were evaluated separately (no interaction among criteria) with different approaches that are accurately presented in the Attachments II.2 and II.4.

As a consequence, weights for score aggregation at the bottom of the tree structure (part B) are not NAMs, which means that the aggregation form is here a simple Weighted Summation; on the opposite, summary at higher levels (part A) is more complete for it adopts the Villas model. This distinction was unavoidable, since the collection of NAM weights at the lower level would lead to an extremely long questionnaire that could produce only partial or inconsistent judgements. Despite the strict organisation of criteria - never exceeding 5 elements in the same group – the considered elements were still too numerous; on the other hand, further simplification of criteria would reduce the efficiency of the models too much.

Table 5: Profile of Consulted People in Reference to the Part/Approach of the Analyses

approach/ part	LOCAL*	GLOBAL*
	VOCATIONALITY ANALYSIS	**SUSTAINABILITY ANALYSIS**
A	architects urbanists public administrators investors	architects urbanists public administrators landscape arch./ecologists economists
B	architects, urbanists, ecologists/landscape architects users = citizens	designers** (architects, landscape architects, urbanists, engineers, etc.)

* *Local people = from Gorizia or Nova Gorica; global = from outside this area*
** *Prevalently*

The Method of Edges

According to the previous paragraph, weights from part A (in both analyses) are NAMs that indicate the importance of each criterion as well as its interaction with others belonging to the same group. These multipliers are based on the opinions of different stakeholders that were asked to express a judgement between 0 and 100 for every edge of the tree structure – that is a hypothetical scenario formed by a combination of only worst and optimal situation for every alternative pertaining to a certain criterion/objective (Giove et al., 2011). Their opinions were turned into a weight included between 0 and 1, with the latter representing the maximum.

3.3.2 Final Weights in the VOC Model

Tables in the appendix (A_III.1) show final weights that are included in the VOC model's structure. Weights refer to the feature described to the right and to the group of uses written at the top of the column. Due to legibility, the table was split in two parts: the first shows weight assigned to the upper levels of the vocationality tree, while the second one gathers weights from lower specification levels. Values that are displayed are already normalised weights that were processed from the questionnaire results as described in the next paragraph.

Normalisation of Weights

In order to facilitate the interpretation of the model's results, weights had to be normalised so that the result would be included between 0 and 1, which allows a direct comparison of the obtained results with an ideal, though impossible, output (equal to 1). In order to guarantee such condition, weights not defined with the method of edges[81] had to be recalculated, respecting initial proportions, as expressed by the questionnaire participants. Therefore, all subcomponents of a set (feature) were normalised by dividing the experts' judgement by the highest total – sum of judgements within the same set – available among the five possible uses (residential, production, accommodation, commercial and administrative, public).

$$\hat{w}_{j\,(A)} = \frac{w_{j\,(A)}}{\max\,(\sum_i^n w_{i(N)})}$$

where: $\hat{w}_{j(A)}$ = is the normalised j-th weight for the use A
$w_{j(A)}$= is the weight defined through the questionnaires for the j-th parameter in reference to use A
$w_{i(N)}$= is the i-th non-normalised weight from the same set of weights (grouped features) for the use N, which obtained the highest total (sum of all judgements within the same set)

The formula above was selected after several tests with other possible normalisation solutions that were though discarded, for they were not respecting the assessment difference among the uses expressed by the questionnaire participants. All weights from the 3rd and 4th level were normalised according to the upper formula and in reference to their grouping.

The only exception is represented by the complementary parameters from the 4th level, which were not normalised, since the user should select only one among the listed features and its weight is already included in the 0-1 range. In this case, normalisation was avoided to prevent flattening of final results by reducing the difference between the five outputs.

[81] The method of edges, adopted in the first two levels of parameters (column A and B in the following tables), already defines weights leading to a maximum equal to 1: in fact, the sum of all weights representing each possible combination of parameters within a set equals 1.

Overview of VOC Weights

This section provides an overview of the adopted vocationality weights at higher levels with some general considerations on the charts that compare the importance assigned to the parameters in reference to each of the five considered uses.

As it can be observed in Figure 12 weights are distributed rather uniformly among the five uses and the four parameters, always providing a positive value for their combinations (synergetic effects). The context quality is particularly relevant for residential use, immediately followed by accommodation, whereas economic context is important to commercial & administration (C&A) and for production. Looking closer to the building and its site (B&S), their quality and special features are appreciated by residential and accommodation uses, by public in second place, while production is looking for highly versatile assets.

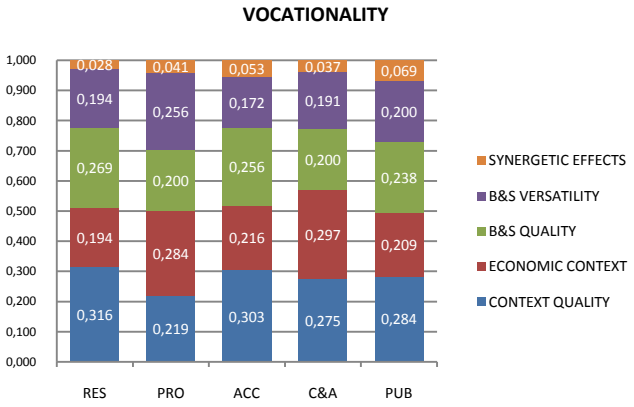


Figure 12: Chart of Vocationality Weights Assigned to Parameters from 1st Level

Within the Context quality group (Figure 13), the Ecological-environmental quality is very important for accommodation and residential purposes, which was also confirmed by the second group of respondents (VOC_B questionnaire), who assessed the parameters at lower levels. However, the latter, while evaluating single components of the Ecological-environmental quality provided higher results for the residential use than for accommodation. Such difference, rather than an inconsistency, should be seen as a way of considering various subjective opinions, which may not only differ from person to person but also when the same subject is asked to make evaluations at different specification levels (assessment modality).

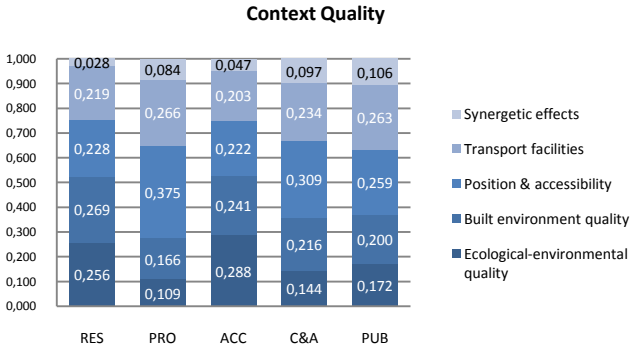


Figure 13: Chart of the Context Quality Group of Weights

Again, residential and accommodation obtained the highest weights for the built Environment quality, where the first is prevalently demanding facility proximity and the second benefits from the vicinity of wine and food trails[82]. Intuitively, production does not depend on natural or built context qualities, but rather on Position & accessibility conditions. Transport facilities are generally important to all uses, although there is a subtle preference for production and public, followed by C&A, residential and accommodation as last. The result may seem incoherent with general expectation and is also in contrast with results from VOC_B (residential first, then public, accommodation and C&A, production last). In this case too, the explanation can be found in the assessment modality: VOC-A respondents were here simultaneously considering all four parameters from the set in reference to a single use, while VOC-B were evaluating each parameter separately, rather than comparing them among the five uses.[83]

[82] Information was deduced from lower-level assessments.

[83] VOC A respondent had to redistribute 100 points among the four parameters for each use (once at a time). As a consequence, in the production use, he attributed low scores to the first two parameters (natural and built quality), awarded the position with some extra

Economic context is essential for C&A, where both zone appropriateness and visibility are requested (Figure 14), immediately followed by production.

On the contrary, B&S quality and features (aesthetic appraisal, secondary buildings and special features) are not affecting production, which is rather depending on Building efficiency (available volume, height and floor load) and open area availability and size. Opposite preferences are associated to accommodation, while residential and public uses provide quite even weights, with residential pointing at quality and public at quantitative aspects (efficiency and size). C&A favours aspects related to the building rather than the open area, which is indeed true for all the other uses as well (Figure 15).

Similarly, building versatility is always preferable to the site versatility (Figure 16). This is particularly true for C&A and production, while the gap is narrowing between accommodation's weights and between residential, providing almost equivalent values for public uses.

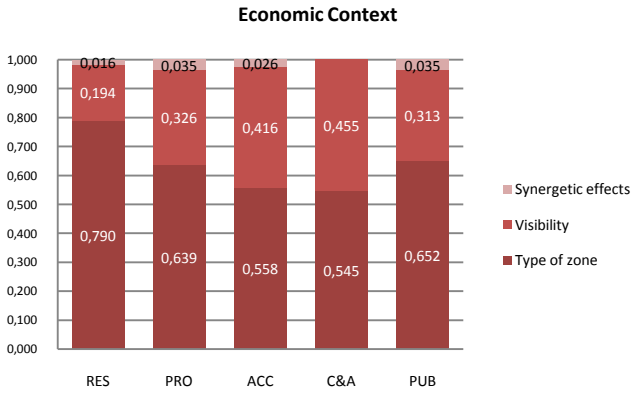


Figure 14: Chart of the Economic Context Group of Weights

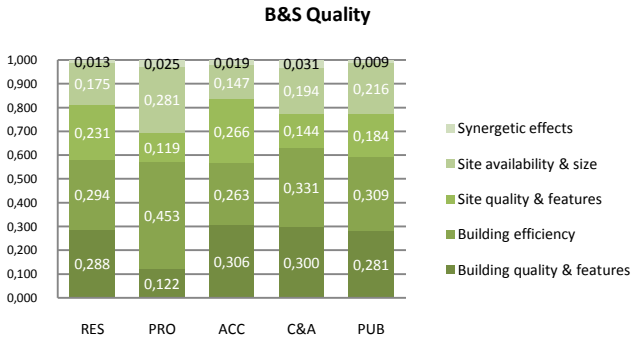


Figure 15: Chart of the B&S Quality Group of Weights

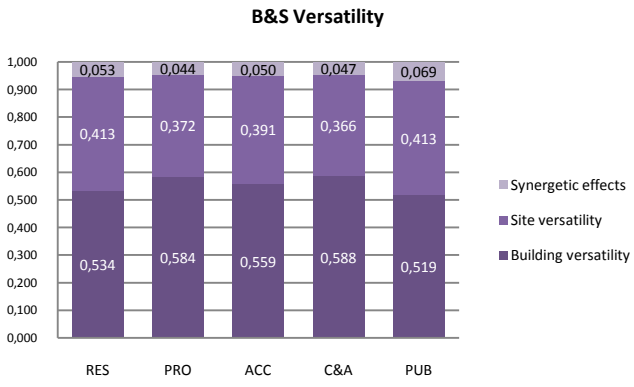


Figure 16: Chart of the B&S Versatility Group of Weights

points and assigned the remaining amount to transport. However, such an amount turned out later to be greater than the ones assigned to other uses, where all four parameters were equally important.

3.3.3 Final Weights in the SUS Model

Normalisation of Weights and Model Tailorability

As for the VOC model, SUS weights from the third level on[84] were normalised too, using a similar formula. In this case, the weight is normalised by dividing its assigned value with the sum of all values within its set or group:

$$\hat{w}_j = \frac{w_j}{\sum_i^n w_i}$$

where: $\hat{w}_j$ = is the normalised j-th weight
w_j = is the weight defined through the questionnaires for the j-th parameter (non normalised)
w_i = is the i-th non-normalised weight from the same set of weights (grouped parameters)

The normalised weight is included between 0 and 1 and each set of normalised weights gives 1 (sum of all the weights within the set), so that it is easy for the user to compare its result, at any node of the tree structure, with an ideal maximum equal to 1.

However, the distinctive feature of the SUS model is the possibility of tailoring the model by excluding (i.e. not considering) certain criteria without compromising model efficiency. In fact, the problem arose from the necessity of applying the tool at different project stages, which are obviously more or less definite and, as a consequence, may not provide all requested answers. In such cases, the model gives the possibility of excluding some parameters by neutralising their effect on the whole evaluation. This particular feature was guaranteed by inserting an additional presence condition that influences the normalisation of weights: normalised values are here recalculated (using the formula above) with reference to the effective sum obtained by the "present" criteria and totally respecting proportions[85] of expert evaluation. The presence/absence condition is controlled by user inputs: if he or she is unable to answer the question, they will choose the "don't know" answer that will exclude the criterion and recalculate all affected weights; on the other hand, all other possible answers correspond to the presence of the criterion.

This particular feature was applied to the last two levels of the sustainability tree – the options & alternatives level and the aspect level – for, in certain cases, all sub-criteria of an aspect parameter could be undefined, thus excluding the aspect parameter itself. On the contrary, it is unlikely that all aspects within the same category are left blank, therefore the presence/absence condition was not included in upper levels. Even though economic sustainability may often not be defined, the opportunity of excluding its parameters was not considered and situations of uncertainty/indefiniteness are here considered as the worst performance, remarking the importance of the simultaneous presence of all three sustainability domains.

Anyway, an exception was made for profitability: since profit cannot be considered if the promoter is public and operates for public benefit (not producing revenues); this parameter can be excluded, or better frozen, by rearranging the matrix of weights defined with the method of edges. The new matrix leaves out all the values assigned to profitability and to its combinations with other parameters, composing a new matrix with 8 combinations instead of 16[86].

[84] The first two levels – macro-category and category levels – were defined with the method of edges, so no normalisation is required.
[85] Difference in the evaluation of sustainability criteria.
[86] Final results may be mis-evaluated, since removing a criterion (after the weights had been assessed) may alter the effect of interactions. Further experimental analyses could define the extent of such distortion, which is however not the aim of this research.

Overview of SUS Weights

According to the average results from the SUS_A questionnaires represented in Figure 17, there is no high prevalence among the three macro-categories that make up sustainability: the three domains were evaluated almost the same, with a subtle preference for the socio-cultural area (0,361/1), followed by environmental sustainability (0,313) and the economic component (0,311). Only 1,5% is the incidence of synergetic effects caused by the interaction among the single macro-categories. Although the results show that people are familiar with the three pillars of sustainability, a higher rating was expected for synergetic effects. In fact, the peculiarity of the evaluation method adopted is indeed the possibility of rewarding positive combinations/interactions of criteria, which is particularly relevant for sustainability's triple bottom line, where sustainability is achieved only if a minimum level of all sub-components is guaranteed (Elkington, 1999).The main explanation of such answers is probably that, despite the information given, the majority of participants were not familiar with the evaluation method. As a consequence, the present model will be able to provide "high" results even if a macro-category is very low, so further measures will be introduced for a correct interpretation of its outputs (see chapter 3.4.3: Interpretation of SUS Results).

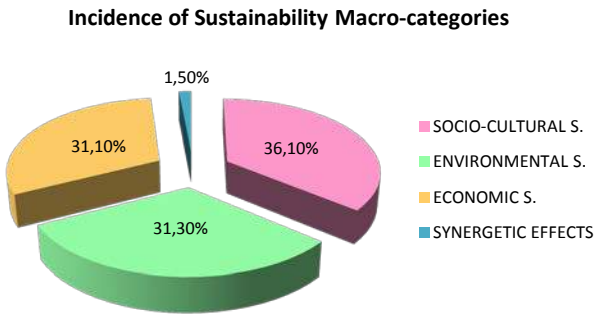


Figure 17: Chart Representing Sustainability Composition

By contrast, all the macro-category subsets registered a negative value for combined effects, due to possible overlapping of parameters or "generous" single evaluations.

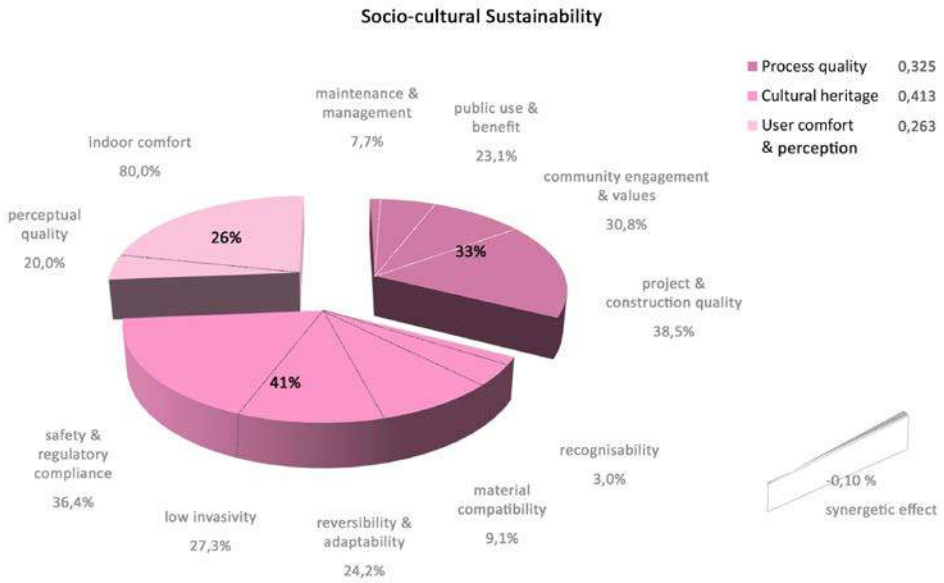


Figure 18: Chart Representing Socio-cultural Sustainability Composition

In the Socio-cultural sustainability domain (Figure 18) the highest weight was assigned to Cultural heritage (0,413), whose sub-criteria are (from the most important to the least): Safety & regulatory compliance (0,364), Low invasivity (0,273), Reversibility & adaptability (0,242), Material compatibility (0,091) and Recognisability (0,030). Process quality is second with an incidence of 32,47% corresponding to a weight of 0,325 and includes: Project & construction quality (0,385), Community engagement & values (0,308), Public use & benefit (0,231)

and Maintenance & management (0,077). Finally, there is User comfort & perception with 26,25%, where the Indoor comfort prevailed on Perceptual quality (0,800 vs. 0,200) (see also A_III.2 for all sustainability weights).

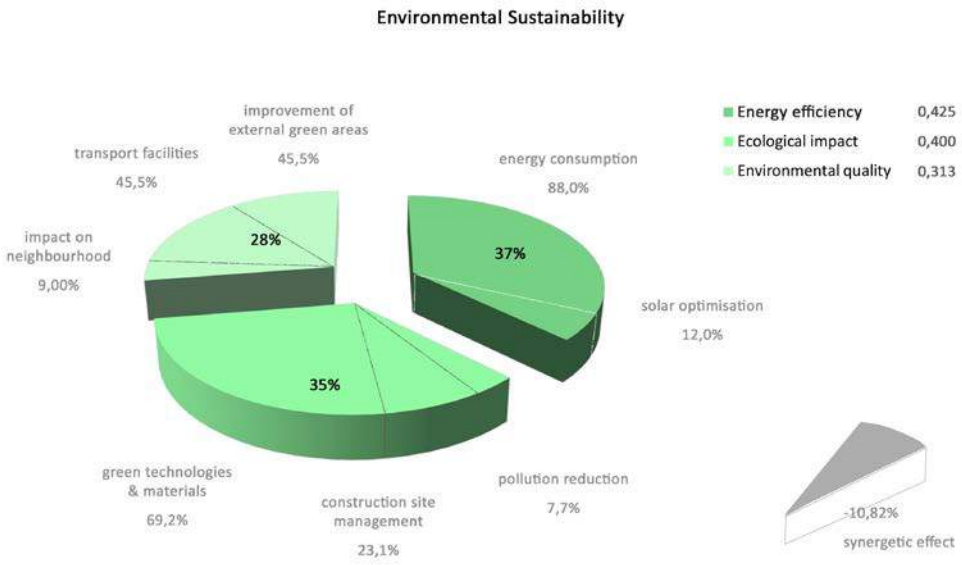


Figure 19: Chart Representing Environmental Sustainability Composition

Energy efficiency with 37,35% (weight 0,425) is still the leading criterion for environmental sustainability, albeit Ecological impact is immediately after with 35,15% (weight 0,400) and Environmental quality last with 27,50% (weight 0,313). The three weights are quite high, exceeding the 1,0 threshold and providing a redundancy of -10,82%. However, examining the single components and their sub-criteria, Energy efficiency is generally associated with Energy consumption (reduction) and less to Solar optimisation (0,880 vs. 0,120); Ecological impact is formed by Green technologies & materials (0,692), Construction site management (0,231) and Pollution reduction (0,077); Improvement of external green areas and Transport facilities are equally concurring in Environmental quality with both 45,5%, while Impact on neighbourhood contributes only with 9,00%.

Among the Economic sustainability parameters the most significant is Profitability weighted 0,375; followed by LCC coverage (0,288) – which includes Financeability (0,597) and Operating cost coverage (0,403); as last Utility and (Low) Risk with respectively 0,275 and 0,263. In general, there is a particularly high redundancy effect of -0,201.

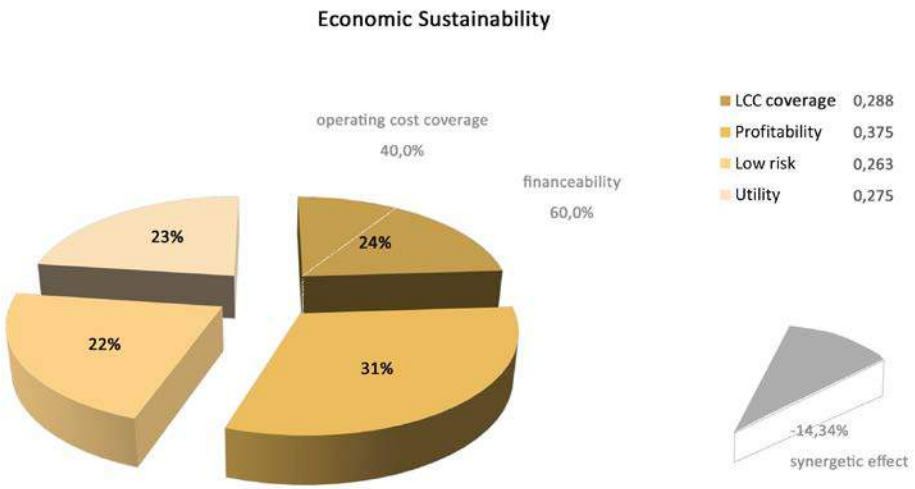


Figure 20: Chart Representing Economic Sustainability Composition

3.4 THE METHOD EXPLAINED STEP BY STEP (USER MANUAL)

3.4.1 Step ONE: The Knowing Phase

Instructions

In order to start a re-use project, the user should first get acquainted with the subject he or she will be working on, understanding its history, values and technical aspects. By completing step one he or she should gain confidence on the building and its site potential and weaknesses that will be at the base of his re-use/preservation project. However, in order to adequately fill in the building ID, the user should carry out research: bibliographic, archival, etc. for historical information, as well as personal visits for accurate measurements, qualitative analysis and diagnosis, photographic surveys, economic analyses and laboratory tests or *in situ* (if necessary) and, of course, social surveys by talking to neighbours and local people to understand their expectations and needs (Figure 21).

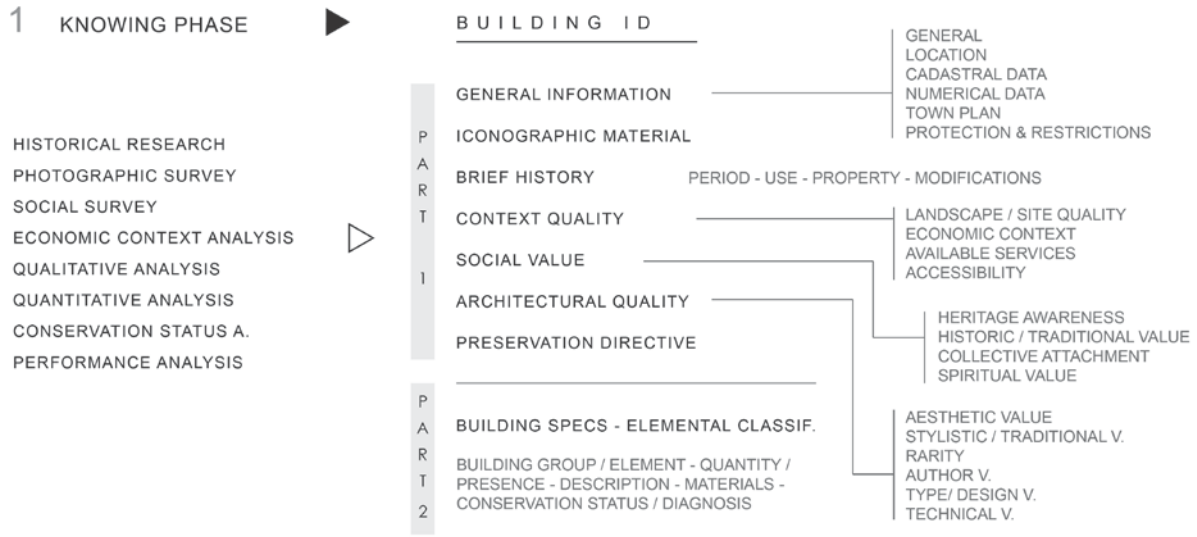


Figure 21: Completing the Building ID (Lombardi et al., 2015)

As mentioned in the previous chapter, the building ID is composed of two parts: the first reports general information and a critical examination of potential values of the building and its site; the second is a more specific analysis of building elements, techniques, materials and conservation status. In the following section all requested information will be presented in detail.

First Part

General Information on the Building

The first part starts with a section titled "General information on the building", where the following information should be noted down:

Table 6: Building ID: General Information

GENERAL	*NAME:*	*name or names of the subject – even nicknames – how the subject is called by people*
	CURRENT PROPERTY:	*owner of the subject (person or company)*
	MANAGER AUTHORITY/SITE MANAGER:	*person or company that runs / manages / takes care of the subject*
	TYPE:	*specify building type (single house, block, multi-storey, office tower, etc.) and shape*
	STYLE:	*specify style/s or stylistic influences*
	YEAR/PERIOD OF CONSTRUCTION:	*year or period of construction and of planning (if available)*
	AUTHOR/DESIGNER:	*name and last name of the designer if known; constructor name can also be added*
	ORIGINAL USE/FUNTION:	*first purpose after completion*
	ACTUAL USE/FUNCTION:	*current use; "none" if dismissed*
	CONSERVATION STATUS:	*note down date of restoration and other interventions or evaluation according to the table below*

Table 7: Conservation Status Evaluation (Lombardi, 2012)

EVALUATION		INTERVENTION PERCENTAGE			TYPE OF INTERVENTION	
MARK	QUALITATIVE DESCRIPTION	ORDINARY MAINTENANCE (1)	EXTRAORDINARY MAINTENANCE (2)	RESTORATION / CONSERVATION INTERVENTION (3)	(1)+(2)	(3)
10	excellent	90%	10%	-	*general*	-
9	good	70%	20%	10%	*general*	*point specific*
8		60%	25%	15%	*extended*	*point specific*
7	mediocre	50%	30%	20%	*extended*	*limited*
6		40%	30%	30%	*diffused*	*limitato*
5	bad	30%	30%	40%	*diffused*	*prevalent*
4		20%	30%	50%	*partial*	*partial*
3	poor	15%	25%	60%	*moderate*	*diffused*
2		10%	20%	70%	*limited*	*diffused*
1	ruin	-	10%	90%	*point specific*	*general*

where the types of intervention are defined as follows:

- ordinary maintenance: ordinary maintenance and repairs are activities that owners or users are obliged to undertake periodically in order to be able to use assets over their expected service lives (they are current/maintenance costs that cannot be avoided, do not improve the equipment or make it last longer, but maintains it in good working condition);[87]
- extraordinary maintenance: is a major repair to an asset that extends its useful life beyond what was originally predicted; is an upgrade or overhaul that makes an asset last longer or increases its usability with major, unexpected expenditures;[88]

[87] https://stats.oecd.org/glossary; http://www.myaccountingcourse.com/
[88] Idem.

- restoration or conservation intervention: all actions taken to maintain a subject in its existing condition or to return it to an known earlier status (e.g. original), minimise the rate of change, and slow down further deterioration and/or prevent damage; responsible restoration applies minimal intervention;[89]

In addition to the general information, the following data is also requested:

Table 8: Building ID: Other General Data

LOCATION	*NATION:*	*specify country where the subject is located*
	MUNICIPALITY:	*specify municipality or region*
	CITY/TOWN/LOCALITY:	*specify city of belonging*
	ZIP CODE:	*insert postal code*
	ADDRESS & CIVIC No.:	*street name and number*
	COORDINATES:	*y, x axes*
	ALTITUDE MSL [m]	*altitude above sea level in meters*
	CLIMATIC ZONE [GG]:	*specify zone and dd (degree day)*
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	*specify cadastral area*
	CADASTRAL MAP/SUBJECT No:	*number of cadastral map and/or subject*
	PARCEL/CAD. UNIT:	*number of parcel (lot) or cadastral unit*
NUMERICAL DATA - site	*LOT AREA [m^2]:*	*total lot area in square meters (building footprint included)*
	COVERED AREA [m^2]:	*building footprint in square meters (all projections)*
	UNCOVERED AREA [m^2]:	*= lot area – covered area*
	BUILT AREA [m^2]:	*total NON permeable UNcovered area*
NUMERICAL DATA - building	*No. OF STOREYS ABOVE GROUND:*	*insert number of levels above ground (main building)*
	No. OF STOREYS UNDERGROUND:	*insert number of underground levels (semi-underground included)*
	TOTAL STOREY No.:	*sum above lines*
	PLANT AREA [m^2]:	*total gross area (walls included) of the building plant*
	AVERAGE HEIGHT [m]	*average height of the building (ground to roof)*
	TOTAL NET AREA [m^2]:	*net floor area (no walls), stairs included, all floors*
	TOTAL VOLUME [m^3]:	*= plant area x average height (gross)*
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	*zone type according to urban plan zoning*
	SPECIFICATIONS:	*additional information*
	NOTES:	*optional*
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	*YES or NO; if yes, specify if it is a cultural heritage listed building or protected by urban plan regulations or other...*
	REGULATORY REFERENCE:	*cite protocol or reference number, act, etc.*
	FROM DATE/YEAR:	*date or year since it is protected*
	OTHER RESTRICTIONS:	*if YES specify, otherwise write NO*
NOTES:	*OTHER INFORMATION:*	*optional (e.g. estimated market value, etc)*

[89] (History SA & Government of South Australia) http://community.history.sa.gov.au/files/documents/conservation-restoration-preservation-definitions-pdf.pdf

Iconographic Material

Photographic survey of current situation and all photographs from the past (and of past interventions) should be collected in a separate folder along with available graphic material (plans, cross-sections, facades, details, drawings, etc.). This sort of dossier[90] could also contain reference tables for the location of the building elements from the second part of the ID.

Brief History

In this section the user should recreate a history table, noting down – line by line – all modifications over time, such as change of the building purpose, property transfers or physical interventions.

Table 9: Building ID: Brief History

BRIEF HISTORY			
PERIOD	USE & FUNCTION	PROPERTY	MODIFICATIONS
precise date (if known) or year, time period or century	*purpose (use) of the building during the period under consideration*	*owner/s (name and last name, if available) or family and other information on occupants and tenants if relevant*	*interventions (renovations, additions, demolitions, etc.) and their motivations, building conservation status or other significant information*

Context Quality

This section starts the appraisal of values and potential of the building and its site position and both extrinsic and intrinsic features, starting with the observation of the context quality as described below:

Table 10: Building ID: Context Quality

CONTEXT QUALITY	*LANDSCAPE QUALITY/FRAME:*	*describe urban context, its position in reference to the considered subject, its prevailing building types and other characterising features;* *similarly,* *describe also natural context*
	SITE QUALITY:	*character of the lot and adjacent land today and in the past – describe current and historical asset; specify biodiversity and characteristic vegetation (name species if relevant)*
	ECONOMIC CONTEXT:	*specify economic context where the subject is located by choosing among: historic or urban centre / commercial / touristic / business / production / industrial site / agricultural / natural and recreational context or other (specify)*
	AVAILABLE SERVICES:	*referring to the close environment, list available activities and services: accommodation (hotels, B&Bs...), recreation (type of trails and activities), commercial, food service, etc.*
	ACCESSIBILITY:	*main infrastructural connections (type of road) and transport facilities (public buses...)*

[90] Due to easier consultation it is suggested that the dossier should be digital and that all physical material should be computerised.

Social Value

Social value represents all those abstract meanings that the building and its site have gained over time thanks to special events, actions and habits.

Table 11: Building ID: Social Value

SOCIAL VALUE	*HERITAGE AWARENESS:*	*describe community's perception of the subject as a cultural / natural / other type of heritage*
	HISTORIC/TRADITIONAL VALUE:	*association with important people / events / ideas; evidence of local / regional / national history; (specify period too)*
	COLLECTIVE ATTACHMENT VALUE:	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use of the building and its site over time;*
	SPIRITUAL VALUE:	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*

Architectural Value

This section gathers aesthetic features as well as other values that are connected with authorship, style and design, technique or rarity.

Table 12: Building ID: Architectural Value

ARCHITECTURAL VALUE	*AESTHETIC VALUE:*	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness;* *decorative apparatus (exterior and interior)*
	STYLISTIC/TRADITIONAL VALUE:	*principal characteristics of a particular class / period of style / tradition; name type and common classification of the subject's style/s and influences*
	RARITY VALUE:	*demonstrates uncommon / rare / endangered aspects or it is a special case (uniqueness)*
	AUTHOR VALUE:	*association with life / work of an important person / group of architects/designers*
	TYPE/DESIGN VALUE:	*significant plant form / project solution / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples), etc.*
	TECHNICAL VALUE:	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*

Preservation Directive (if available)

If there are specific directive and restrictions from the authority in charge for the subject's preservation, these guidelines should be summarised in this section. Restrictions deriving from the urban plan (town plan) can be included too. In addition to this, also indications on procedural aspects or other mandatory requirements can be noted down.

Second Part

Building Specifications - Elemental Classification

In the second part the building undergoes a more detailed and technical analysis through a classification of building elements that provides additional information on location/use, dimensions and quantities[91], material composition and conservation status of the element. To facilitate element location construction drawings (plans, layouts) can be attached to the present analysis, which is structured in a table, as follows:

Table 13: Building ID: Building Specifications

MAJOR GROUP ELEMENTS	GROUP ELEMENTS	QUANTITY / PRESENCE	DESCRIPTION	MATERIALS	CONSERVATION STATUS / DIAGNOSIS
common accepted subdivision of building groups of elements, i.e.: A: substructure, B: superstructure (load bearing), C: partition and closure, D: finishes, E: decorative elements, F: service and conveying systems, G: site equipment.	*further specification of the previous level (see following table for more details)*	*write down quantity in reference to the unit measure provided or Y/N (yes or no) for presence / absence of the considered group of elements (group F)*	*describe the different types of the considered element present in the construction specifying materials and dimensions, texture, installation/laying and location (level and direction[92]) in the construction.*	*list all constitutive materials*	*report conservation status of the considered element: problems and causes, location of the problem/s as well as previous interventions and additions*

Group of elements are explained below:

Table 14: Building ID: Elemental Classification

MAJOR GROUP ELEMENTS	*DESCRIPTION*	GROUP ELEMENTS		*EXPLANATION*
A SUBSTRUCTURE	*load bearing structures under ground level*	A01	Foundations	*shallow (spread footings or slab on grade) or deep (piles, piers, etc.)*
		A02	Ground floor	*floor on ground; if it is a slab on grade write "see foundations"*
		A03	Basement walls	*perimetral load bearing walls (in contact (even indirectly) with earth); internal basement walls should be described in B03*
B SUPERSTRUCTURE	*load bearing structures above ground level*	B01	Frame	*beams and columns (perimetral or internal)*
		B02	External Walls	*perimetral load bearing walls*
		B03	Internal Walls	*non-perimetral load bearing walls; they can be located in reference to room number or function – a classification map should be attached)*
		B04	Upper floors	*intermediate floors and vaults (except ground, roof and projections)*
		B05	Roof	*roof and terraces*
		B06	External stairs	*stairs outdoor (includes secondary stairs and fire escape stairs)*
		B07	Internal stairs	*stairs indoor*
		B08	Projections	*balconies or similar*
C PARTITION &	*non-load bearing structures of the*	C01	Interior partitions	*non-load bearing walls that divide indoor space*
		C02	Internal doors	*doors that connect indoor rooms and*

[91] Quantification is optional, but could offer some support to later cost accounting.
[92] North, East, South, West etc.

	CLOSURE	*building envelope or indoor (space division)*			*spaces*
			C03	External doors	*doors that connect indoor space with the outside*
			C04	Windows	*all external windows and roof windows; if internal windows are present, specify it here*
D	FINISHES	*finishing and coatings of walls, floors, ceilings, stairs and roofs, including doorsteps*	D01	External wall finishes	*outdoor wall coating, cladding, etc.*
			D02	Internal wall finishes	*indoor wall coating, cladding, etc.*
			D03	Stair finishes	*finishing and coating of stairs (if different from structure material)*
			D04	Floor finishes	*floor finishing (surface)*
			D05	Ceiling finishes	*ceiling finishing (including false ceiling)*
			D06	Roof finishes	*roof coating (all layers except load bearing structure can be noted here)*
			D07	Doorstep	*indoor and outdoor doorsteps*
E	DECORATIVE ELEMENTS	*elements that enrich and beautify the building or specific elements*	E01	External wall decoration	*ornaments applied to walls outdoor: statues, bas-reliefs, frescoes or textures like rustication (ashlar-work) or quoins, etc.*
			E02	Internal wall decoration	*ornaments applied to walls indoor (see above)*
			E03	External window and door framing	*ornaments applied to openings outdoor (gratings included)*
			E04	Internal window and door framing	*ornaments applied to openings indoor*
			E05	Roof decoration	*chimneys and other crowning elements e.g.: cornices, etc.*
			E06	Balustrade and parapets	*of stairs, balconies and terraces (gratings excluded – see E03)*
			E07	Other	*space for additional elements not included before*
F	SERVICES & CONVEYING SYSTEMS	*various technologies for guaranteeing health, comfort and safety*	F01	Drainage*	*system for rainwater removal (roof and soil);*
			F02	Plumbing*	*waste water removal and potable water delivery*
			F03	Heating*	*heating system and fireplaces*
			F04	Ventilation & A/C*	*air quality control and cooling system*
			F05	Electrical installations*	*visible or non visible wiring and where is available*
			F06	Gas installation*	*gas provision or not and where is available*
			F07	Communication installation*	*telephone, television, satellite, internet, etc.*
			F08	Lifts & Escalators*	*type and location*
			F09	Fire protection*	*type and location*
			F10	Protective installation*	*anti-theft devices (cameras, sensors, etc.)*
G	SITE EQUIPMENT	*all outdoor elements that are part of the property: from surfaces to features and constructions*	G01	Site enclosure	*fence or perimetral wall or other*
			G02	Site paving (hard landscaping)	*type and location of hard paving (all but grass)*
			G03	Soft landscaping	*green surfaces: type (grassland, flowerbed, etc.) and location*
			G04	Site services (public utilities)*	*public utilities installation (drainage/water/gas/electrical/telephone services) and location*
			G05	Site buildings*	*other, secondary buildings on the same plot, location and use/type*
			G06	Site fittings*	*parking places, illumination, etc. (location)*

* rather than material specification, provide a description of the type currently installed

3.4.2 Step TWO: Vocationality Analysis

Instructions

After completing step 1 and getting certain knowledge of the building and the site the user is working at, he or she should define a new use for the considered subject. The vocationality evaluation model from part two should rank the five groups of uses listed below according to the availability of the features contained in the evaluation model and in reference to their importance for each of the considered uses:

- **RES** **RESIDENTIAL**: houses, apartments, etc.
- **PRO** **PRODUCTION**: small factories, artisan production, distribution and logistic activities (or shopping centres)
- **ACC** **ACCOMMODATION**: hotels, B&B, hostels, residence halls, etc
- **C&A** **COMMERCIAL & ADMINISTRATION**: public or private offices and retail
- **PUB** **PUBLIC**: cultural, educational, sport services

The evaluation model is from the user's point of view a sort of questionnaire, where he is only asked to verify if the feature described in the model is present in his case or not, by choosing between "yes" or "no" – this simple approach guarantees an easy and very quick assessment of use compatibility. Moreover, the model can be seen as a sort of description table of the conditions and features available in the territory, area and in the building and site to re-use, on the basis of which the best use option will be shown.

In practice, the user will start completing the model from the lowest (more specific) available level and with the help of the descriptions provided he or she will select "yes" or "no" from a scroll-down menu in the yellow-coloured "EVALUATION" column (see Attachment V). The most specific options of some features can be excluding alternatives or co-existing options: in the first case, one option excludes the others, so that only one choice is available at a time;[93] in the second case, none to all available options can be selected, because two or more features can be simultaneously present. In general, the user should refer to the present condition, however, when a certain feature has not yet been realised but it has been approved, it should be considered as fulfilled.

Once that the whole yellow Evaluation column is complete, the model will aggregate results and turn out values on a range 0-1 for each level and each feature until the final "vocationality" indicator that will summarise all previous considerations into five single numbers – again included between 0 and 1 – that will represent the suitability of the B&S to accommodate the five different groups of uses (Figure 22). As in the following sustainability model, the selected range of 0-1 offers an intuitive understanding of the obtained level of appropriateness, thanks to an easy comparison with the total appropriateness equal to 1 (ideal maximum).

Finally, the model outputs should always be interpreted by the user: the model is not meant to provide absolute solutions/answers, but it rather offers a support when considering the effects and desirability of certain features in relation to different uses. Therefore, the user will critically analyse the results and will then define more specifically the function or functions to accommodate (see section: Interpretation of Results). There is also an additional possibility of choosing a mix of uses that would be particularly interesting to consider when single results (for each use) are homogeneous.

Description of Features

The features that constitute the vocationality tree are grouped according to the different extent of territory they refer to:

- CONTEXT QUALITY – TERRITORY (region and city)
- ECONOMIC CONTEXT – AREA (neighbourhood)
- BUILDING & SITE (construction and its plot, close surroundings of the building)

[93] The user should affirm "yes" only once, otherwise an error message will be displayed.

with the latter having two groups: the “b&s quality & features” and the “b&s versatility”. These first-level-features are further determined in the following levels, as shown in the tree layout (Figure 23).

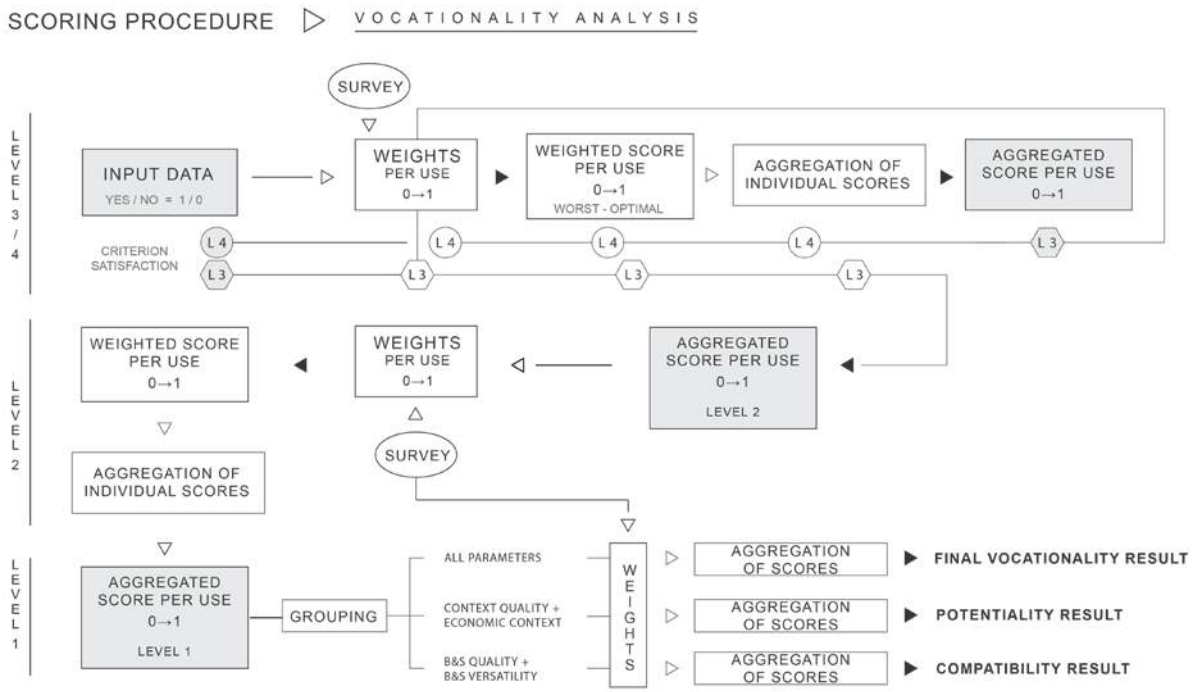


Figure 22: Vocationality Scoring Procedure

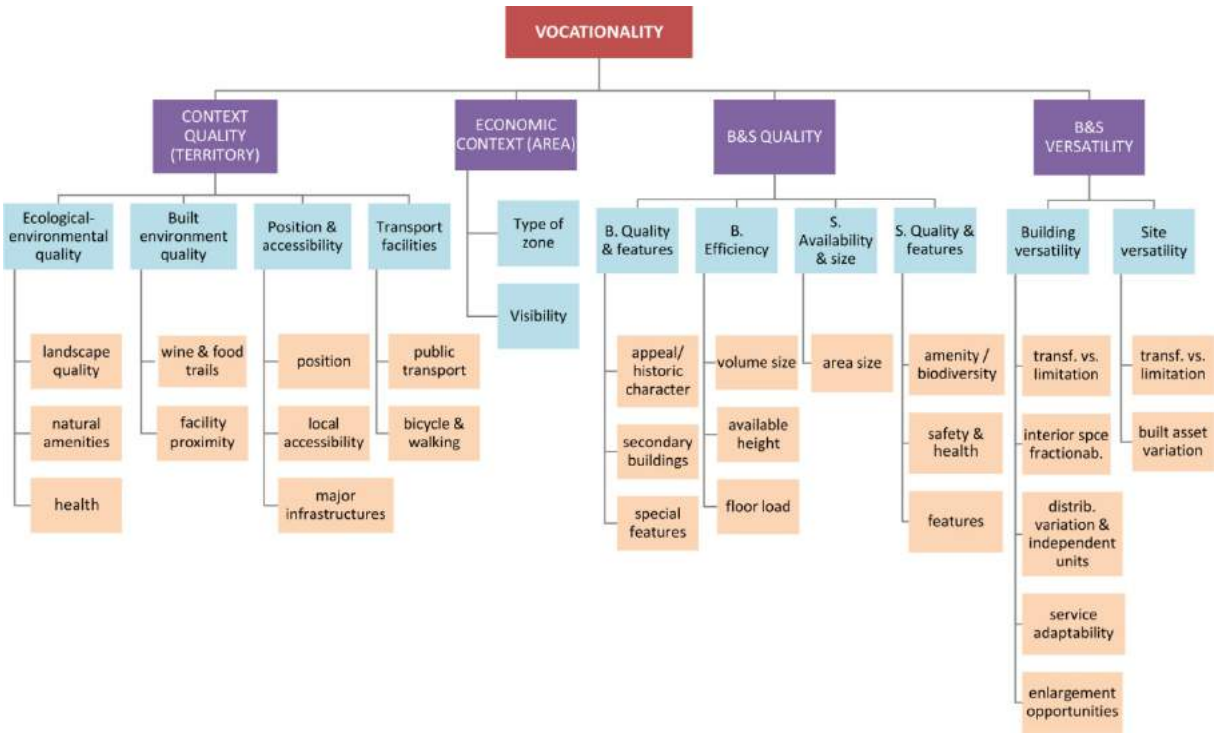


Figure 23: Vocationality Tree Layout

The Context Quality

This first group of features evaluates broader location features (on a regional scale) that refer to:

- ECOLOGICAL-ENVIRONMENTAL QUALITY: includes availability of panoramic views, presence of natural sites and parks in a healthy environment;
- BUILT ENVIRONMENT QUALITY: considers the presence of wine & food trails, facilities proximity (sport, education, commercial, etc.); it should also consider proximity to cultural-historic cities/sites or trails, that have been here omitted, since the considered region (Gorizia and Nova Gorica) already satisfies this requisite;
- POSITION & ACCESSIBILITY: the subject is situated in the most suitable location (urban-suburban area) in relation to each of the considered use-groups and is well serviced with local and/or major infrastructures;
- TRANSPORT & FACILITIES: the subject is in an area well serviced by public transport and provided with bicycle or walking trails.

Further specifications are described in the following table:

Table 15: The Context Quality Branch

ECOLOGICAL-ENVIRONMENTAL QUALITY		
LANDSCAPE QUALITY		presence of panoramic views (also on built environment) from the plot perimeter
NATURAL AMENITIES		presence of gardens, parks, natural reserves, etc. in 500 m range
HEALTH		low polluted context, especially in reference to good quality of air (no factories or highways/railways nearby)
BUILT ENVIRONMENT QUALITY		
WINE & FOOD TRAILS		vicinity to wine & food itineraries (Collio, S. Floriano, Brda) <5' by car
FACILITY PROXIMITY		presence of a certain type of service within the range of ca. 1 km
○	gastronomy	presence of restaurants, cafes or other food services
○	education facilities	presence of kindergartens, schools (various levels), libraries, etc.
○	public administration	presence of public offices and post
○	medical provision	presence of hospitals or other healthcare services
○	sport & leisure facilities	presence of municipal gardens, parks, equipped places, courts, gyms, etc.
○	service providers / retail, commercial facilities	presence of shops, supermarkets, banks and other services
POSITION & ACCESSIBILITY		
POSITION		building position (and area vitality) in reference to its town/city of belonging, assuming that city centre is lively and suburban area is calm
•	urban centre	c.so Verdi and Italia, P.zza Vittoria; Bevkov trg, trg E. Kardelja, Šempeter (and similar areas)
•	city / town edge	Piuma, Montesanto, Straccis, etc.; Solkan, Rožna dolina, Vrtojba, etc. (and similar areas)
•	suburban	S. Andrea, Piedimonte, Lucinico; Miren, Volčja Draga, Prvačina, Šempas Ozeljan, etc. (and similar areas)
LOCAL ACCESSIBILITY		type of infrastructure that leads to the site (predominant)
•	county road (regional)	>50 km/h or: Mainizza, Via Trieste, Via III Armata; Kromberška cesta, NG-Šempeter;
•	urban / local road	<50 km/h
MAJOR INFRASTRUCTURES		proximity of major infrastructure nodes
○	highway exit	highway exit within 3 km range
○	railway station	railway station within 1 km range
TRANSPORT FACILITIES		
PUBLIC TRANSPORT		availability and efficiency of public transport in reference to proximity and frequency
○	bus stop proximity	the nearest bus/tram stop is within 300 m range (urban service distance)
○	bus frequency	high frequency is considered an average waiting time <15' (urban frequency)
BICYCLE & WALKING		vicinity to walkways and/or bicycle pathways – presence within 500 m

• - excluding alternatives; ○ - co-existing options.

The Economic Context

This second group of features mainly refers to zoning and visibility conditions of the building position that is limited to a narrower context, as for example urban area or neighbourhood.

Table 16: The Economic Context Branch

TYPE OF ZONE		zone type according to dominant type of service/buildings in the area/neighbourhood
•	residential	area with houses, villas, apartment blocks, etc.
•	production	industrial zone/craft quarter or shopping centre area/bigger shops
•	touristic / gastronomic	city/town centre or Collio / Brda area
•	administrative/ commercial	offices, schools (public services), shops, cafes and other service providers or activities
•	agricultural	rural, farming activities and environment (except Collio/Brda area)
VISIBILITY		building potential to be seen due to strategic position or context set-up (not hidden by vegetation, trees, etc.)

• - excluding alternatives; ○ - co-existing options.

The B&S Quality

Building and site qualities are divided in building features and site characteristics, as follows:

- BUILDING QUALITY & FEATURES: the building has a special appeal and features or a historic character, secondary buildings are also available;
- BUILDING EFFICIENCY: available size/volume, height and floor load are compatible with the considered use;
- SITE AVAILABILITY & SIZE: open space is available and the plot has an appropriate size for the considered use;
- SITE QUALITY & FEATURES: the site is pleasant and rich in biodiversity with some special features, has low risks and pollution.

More specifically:

Table 17: The B&S Quality Branch

BUILDING QUALITY & FEATURES		
APPEAL / HISTORIC CHARACTER		aesthetic appraisal and relevance of the building; building appeal, attractiveness
SECONDARY BUILDINGS		presence of accessory buildings (or other buildings within the plot/property)
SPECIAL FEATURES		presence of special elements like balconies, terraces, views, etc.
BUILDING EFFICIENCY		
VOLUME SIZE		dimensional characteristics of the building small/medium/big
•	small	(<1000 mc)
•	medium	(1000-5000 mc)
•	big	(>5000 mc)
AVAILABLE HEIGHT		indoor available height is up to 3,00 m
FLOOR LOAD		max floor load is greater than 300 kg/sqm
SITE AVAILABILITY & SIZE		
AREA SIZE		availability or not of a small, medium or big open-space area in reference to the covered area (inverse lot coverage)
•	none	no open area is available
•	small	<100% open are is less than the covered area (building footprint)
•	medium	100 -200% open are is at least as big as the building footprint or at maximum twice
•	big	>200% open area is more than twice as big as the building footprint
SITE QUALITY & FEATURES		
AMENITY / BIODIVERSITY		open are is provided with certain biodiversity, ecosystems (streams, trees, etc.) or has a particular historical arrangement, etc.
SAFETY & HEALTH		there is low danger of natural hazards (floods) or unhealthy/annoying environment (noise, visual, soil contamination, etc.): e.g.: are there danger signals? (known situation of potential hazards) or: if you're staying there is the environment quiet and comfortable? (direct experience)

FEATURES	presence of recreational areas, swimming pools, wells/fountains, children playground, etc. within the plot itself or on adjacent plots that are accessible to public

• - excluding alternatives; ○ - co-existing options.

The B&S Versatility

Another aspect referred to the subject scale is its modifiability – i.e.: the possibility of undergoing both outdoor / external and interior changes. Design freedom could be limited by regulation for heritage preservation, other urban restrictions or by intrinsic qualities of the building, usually deriving from the layout of load-bearing structures. These particular relation between opportunities and limitations is expressed by means of the features described in the table below. Also in this case versatility was related to the building on one side and the open space (site) on the other:

- BUILDING VERSATILITY: the building[94] is well-disposed to change: there are few limitations, high layout flexibility, space fractionability, distribution variation, service adaptability, raising or enlargement possibilities;
- SITE VERSATILITY: the site is well-disposed to change, for is not protected or it can be rearranged; its built asset can also be transformed with new construction or demolition of existing secondary buildings.

Table 18: The B&S Versatility Branch

BUILDING VERSATILITY		
TRANSFORMATION VS. LIMITATION		limitations to building modification due to heritage prescriptions or urban plan; if no specification is provided, say what should be preserved according to personal observations with the help of "knowing phase"
○	preservation of the exterior	preservation of exterior finishing and appearance
○	preservation of the interior	preservation of interior finishing and appearance
○	building techniques	obligation to maintain or adopt certain construction methods (historic, local, similar to existing, etc.)
○	preservation of specific elements	obligation to maintain certain elements (e.g. machinery, art pieces, etc.) in their location
INTERIOR SPACE FRACTIONABILITY		possibility of new space configurations (limitations from strictness of the plant scheme (load-bearing structure) are acceptable) - free plan: in most part of the building it is possible to subdivide space into minor rooms or to demolish partitions to obtain larger spaces
DISTRIBUTION VARIATION & INDEPENDENT UNITS		possibility to change connections and paths in the building and to divide the building in two or more independent units
SERVICE ADAPTABILITY		modifiability of current plants and service systems (HVAC and other)
ENLARGEMENT OPPORTUNITIES		possibility of construction raising, enlargement or new construction in adherence – in reference to the main building
SITE VERSATILITY		
TRANSFORMATION VS. LIMITATION		limitations to external areas due to preservation of habitats, biodiversity, environmental quality
○	animal / landscape protection area	obligation to safeguard animals and their habitat that are present in the site or to maintain landscape and environmental quality (no alteration) or specific vegetation species
○	preservation of specific elements	obligation to maintain certain elements in the open-space (e.g.: wells, fountain, statues, etc.)
BUILT ASSET VARIATION		possible operations on existing and new buildings construction
○	new building construction	possibility to construct new buildings on the lot
○	demolition of secondary buildings	possibility to demolish some/all existing secondary buildings

• - excluding alternatives; ○ - co-existing options.

[94] "Building" is meant as the main construction within the plot (primary, main building); as a consequence all sub-parameters should be considered only in reference to the main subject if not specified otherwise.

Interpretation of VOC Results

The VOC model was designed to produce a final set of results included between 0 and 1[95] that are easily translated by the user into a preference ranking of possibilities. However, the model testing in different case studies suggested an additional reading of the model outputs. Since the vocationality is composed of a part that assesses the context conditions and a second one that focuses on the asset (b&s) characteristics, it is also interesting to compare the final results with these two partial performances, that could respectively summarise the point of view of stakeholders on one side and of the controlling authority for historic preservation on the other. So, the Context quality and the Economic context were gathered under the "POTENTIALITY" result, while the Building & Site quality and the B&S versatility represent the "COMPATIBILITY" set of preference. As a result, the user has the possibility to discuss the best option to choose, by comparing the FINAL VOCATIONALITY RESULTS with the POTENTIALITY and the COMPATIBILITY rankings, which could confirm certain results or produce different preference orders. Particularly when outputs are in contrast, it is important, that the user analyses further the four main parameters from the first level: only by looking deeper, at partial results, the obtained scores might be verified and explained[96].

In addition to this, the model was also provided with a formula that calculates the threshold of "unsuitability", which is similar to the method adopted for the calculation of abnormally low tenders.[97] The so-calculated-minimum is not a fixed percentage or value, but it depends on the model outputs, and can exclude certain uses, for they obtain much smaller results than the average assessment of the others. The threshold is again calculated for all results – the final vocationality, potentiality and compatibility, as well as the four main features. The three output-sets of grouped parameters could exclude the same use or different uses: however, in order to respect both points of view (stakeholders' and the one of the control authority), the user should generally not consider in the final vocationality ranking those uses that were excluded in the potentiality and the compatibility results[98] (see also: vocationality analyses of case studies).

[95] 1 is an ideal maximum, that cannot be pursued, since the model is also composed of complementary choices (4th level of the vocationality tree), where the model picks only the weight assigned to the selected feature, (defined on a scale 0-1, almost never equal to 1) and, therefore, returns a result <1.

[96] It can occur that either the model is not able to consider particular situations or the user has not properly evaluated a/some parameter/s.

[97] The threshold is here defined as the difference between the average result and the average difference between the average result and the smaller results.

[98] Of course, obtained rankings and exclusions must be verified first.

3.4.3 Step THREE: Sustainability Analysis

Instructions

After completing step 2 and interpreting the vocationality model outputs, the user should define the new use/s for his subject and prepare a draft version of his project.

The user should then assess his project in reference to all criteria, starting from the most specific level, which, with regard to the sustainability analysis, is "options & alternatives". All criteria are described and an additional question, starting with "Does the project..." helps the user to enter his values in the yellow "EVALUATION" column[99]. According to the question, there are three possible set of answers:

Table 19: Set of Answers for the Sustainability Analysis

SET OF ANSWERS	POSSIBLE ANSWERS	APPROXIMATE % RANGE*	CORRESPONDING VALUES 0-1
1)	yes / in part / no *don't know*	-	1 / 0,5 / 0 -
2)	absolutely mostly in part not enough not at all *don't know*	81-100% 61-80% 41-60% 21-40% 0-20%	1,00 0,75 0,50 0,25 0,00 -
3)	many some a few a couple no *don't know*	-	1,00 0,75 0,50 0,25 0,00 -

* percentage range was inserted to help the user to locate his situation and to find a suitable answer; no in-depth calculation is required!

The user scrolls down the menu and selects his answer in the Evaluation column; this will be automatically turned into a number between 0-1 that will be further processed until the final summary indicator of sustainability performance.

No answer should be left blank, therefore, in case of uncertainty or when the project solution is not defined yet, the user should choose the "don't know" option, which will automatically leave out the parameter from the evaluation, neutralising its influence on the evaluation[100]. This particular feature allows a full tailorability of the model to fit different situations and project stages: from early planning phases, where many parameters might not be defined yet, to the final proposal and the realised project (*ex post* evaluation), where most of the uncertainties should be solved.

In addition to this, another possible answer was introduced to appropriately consider those situations, where the project cannot solve or improve a certain feature due to existing circumstances – e.g.: external green areas may not be improved if no open space is available; - in such cases, the user selects the "don't know" answer choosing NP (not present) from the drop-down list next to it, so that the parameter will not affect the sustainability result of the project nor it will lower the reliability of the test[101].

[99] It is however recommended that the user answers with the help of the description tables provided in the next section.
[100] The weight contribution of the neutralised parameter is distributed among the remaining criteria.
[101] The reliability and accuracy of model results are directly related to the level of completion of the model itself, which is calculated referring to the number of "don't know answers" compared to the total answers requested. NP specified answers are completely excluded from the model, by not concurring to the total and not being considered as missing answers. See section "Interpretation of SUS results" for more information.

Finally, these options might be used as follows:

- **don't know**: the project does not provide sufficient information to answer the question (for the parameter's assessment)
- **don't know + NP**: the parameter cannot be considered, since the current situation does not allow the project to improve the considered feature

The sustainability analysis is thought to be verified many times by continuously integrating and reviewing previous answers, starting with the testing of the draft project performance until the definition of a more detailed and acceptable solution. No minimum or maximum number of applications is prescribed; this is indeed left to the user's preference.

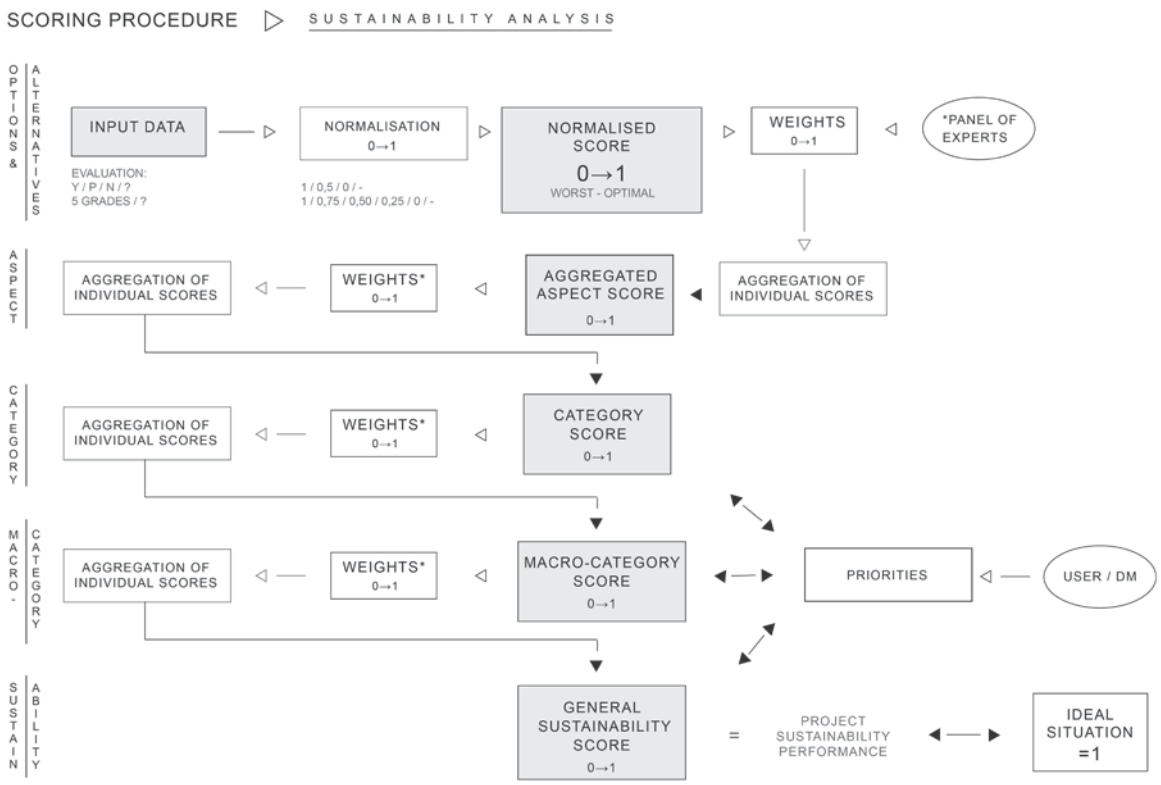


Figure 24: Sustainability Scoring Procedure

Description of Parameters

All elements of the sustainability tree will be now presented from the less specific to the most detailed level, starting with the socio-cultural branch, continuing with the environmental components and finishing with the economic ones. Even if such order follows the inverse path of the user's analysis procedure, it is helpful to understand how the parameters are specified and grouped together.

The Three Macro-categories

As stated before, sustainability is a balanced condition of the three pillars that are here defined as:

- SOCIO-CULTURAL SUSTAINABILITY: sustainability domain concerning active preservation of cultural heritage through the definition of a user/public-centric project, able to answer public needs and to respect people's values;
- ENVIRONMENTAL SUSTAINABILITY: sustainability domain focusing on energy efficiency, environmental quality and low ecological impact;

- ECONOMIC SUSTAINABILITY: sustainability domain that controls financial feasibility (LCC, profit, risk) and socio-economic sustainability (indirect / external benefits).

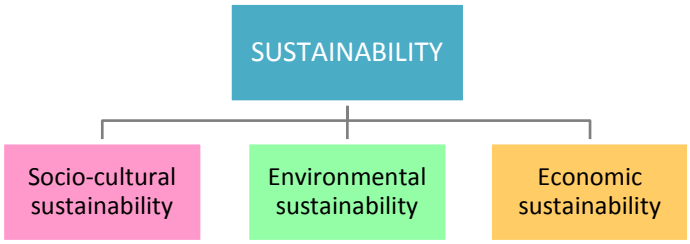


Figure 25: Three Sustainability Macro-categories

Socio-cultural Sustainability Branch

The socio-cultural domain is composed of three categories:

- **Process quality:** high performing project management, based on public participation and choices, that promote a good project and construction quality and facilitate future maintenance;
- **Cultural heritage:** "heritage-friendly" approach that tries to combine regulatory compliance with design solutions that are respectful of the original asset character (not invasive, reversible, compatible and recognisable);
- **User comfort & perception:** attention to design choices that guarantee users' comfort and pleasant perception of the environment.

Their further specification through the Aspect and the Options & Alternatives levels can be found in the following table, where each parameter is described.

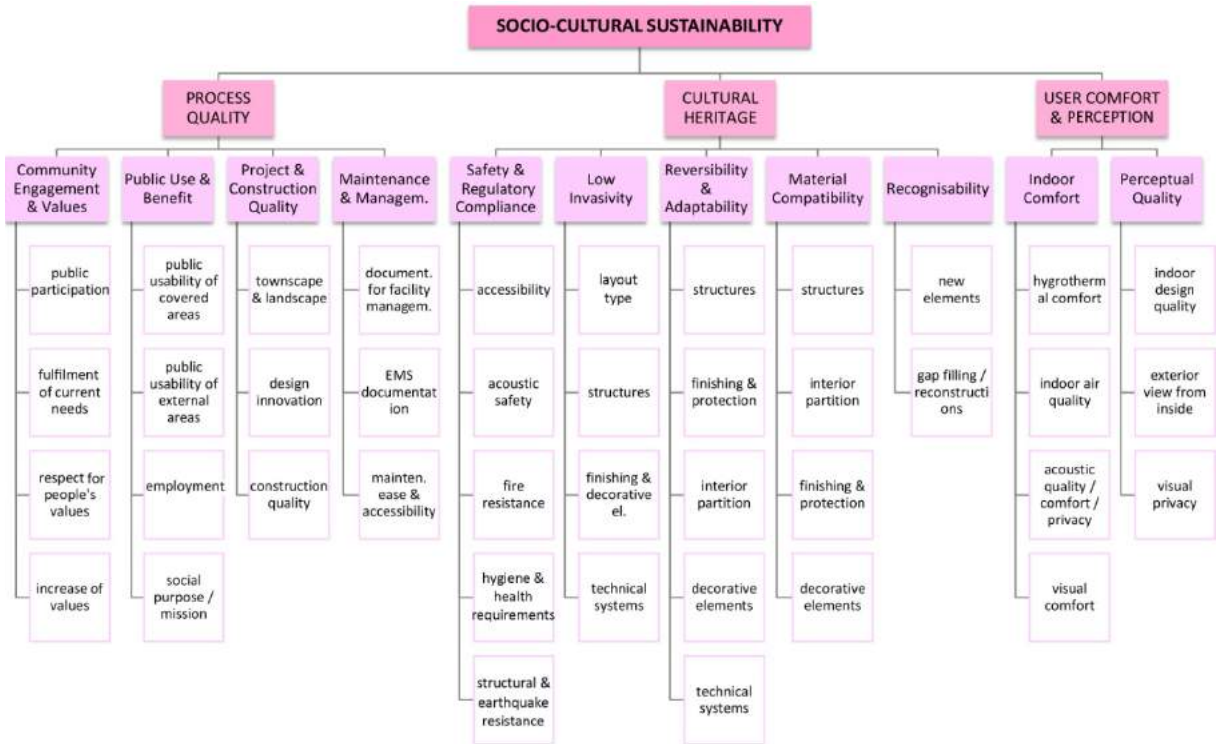


Figure 26: Socio-cultural Sustainability Branch

Table 20: Socio-cultural Sustainability Parameters

PROCESS QUALITY	
COMMUNITY ENGAGEMENT & VALUES	public involvement, respect for people's values and needs
public participation	consideration of involving citizens (for the definition of the new use) and end-users(for the project definition) in the decision process: • YES: people actively participated at various events, following the project definition OR both citizens and end-users contributed to the new use selection and project definition • IN PART: a single event (or other) was organised to collect people's opinions OR only citizens or only end-users were consulted; • NO: people had no opportunity to express their opinions;
fulfilment of current needs	satisfaction of current needs or requests of the community as expressed by people (citizens and end-users): • ABSOLUTELY: almost all needs were answered • MOSTLY: most needs were answered • IN PART: part of the needs were answered • NOT ENOUGH: only some needs were answered • NOT AT ALL: few or no needs were considered
respect for people's values	respect for existing values associated to the B&S as expressed by people (does not erase memory by radically changing appearance, use conditions and enjoyment of the B&S, etc.) • ABSOLUTELY: the project fully maintains existing values • MOSTLY: the project maintains almost all existing values • IN PART: the project maintains only a part of existing values • NOT ENOUGH: the project erases most of the existing values • NOT AT ALL: the project does NOT consider existing values
increase of values	creation of new values (future potential beliefs & rituals) for the B&S or increase of heritage awareness/perception of the B&S importance and values – due to tourism, organisation of public events or because of other initiatives that somehow promote the building over time • YES: the project is meant to promote the B&S • IN PART: the project might (potentially) increase values • NO: the project doesn't seem to affect people
PUBLIC USE & BENEFIT	possibility for people to use open/indoor spaces (even if limited to opening time (certain hours)), creation of new employment possibilities and help to disadvantaged people
public usability of covered areas	possibility for people to use covered areas (indoor spaces) even if limited to opening time: • ABSOLUTELY: >80% of indoor spaces • MOSTLY: between 61-80% of indoor spaces • IN PART: between 41-60% of indoor spaces • NOT ENOUGH: between 21-40% of indoor spaces • NOT AT ALL: the building is not open to public or ≤20% is accessible
public usability of external areas	possibility for people to use external areas (outdoor spaces) even if limited to opening time: • ABSOLUTELY: >80% of outdoor spaces • MOSTLY: between 61-80% of outdoor spaces • IN PART: between 41-60% of outdoor spaces • NOT ENOUGH: between 21-40% of outdoor spaces • NOT AT ALL: the site is not open to public or ≤20% is accessible
employment	creation of new jobs/employment possibilities due to project realisation: • MANY: a considerable number of new jobs is created • SOME: several new jobs are created • A FEW: a small number of new jobs is created • A COUPLE: very few new jobs are created • NO: almost no employment possibilities derive from the project
social purpose / mission	help or supports disadvantaged people (people in poor economic conditions, elder people, people with handicap, immigrants); health care/social housing/education/bureaucratic assistance, etc. • YES: most spaces are meant for social purposes • IN PART: a part of the building is meant for social purposes • NO: no space is meant for such activities

PROJECT & CONSTRUCTION QUALITY	quality of environment, design innovation, certification of construction quality
townscape & landscape	fitting in the urban/natural environment: the B&S design is in accordance with the context (similar style, similar materials or colours, mimetic/imitative design, etc.) • ABSOLUTELY: the building harmoniously completes the environment • MOSTLY: the building is overall part of the environment, although it has some new elements • IN PART: the building has some similarities with the environment, it partially fits in the context • NOT ENOUGH: the building doesn't seem to belong to the environment • NOT AT ALL: the building has a great visual impact on the context
design innovation	introduction of innovative planning aspects such as new material application or treatment, new formal solutions for the proposed use or to solve a specific problem, new construction details, etc. • YES: the project provides an interesting solution that might become an example to follow • IN PART: some aspects of the project re-elaborate existing solutions • NO: the project adopts common solutions
construction quality	consideration of quality control during execution (tests on materials, correct installation and certification, guarantees, etc.) • MANY: many tests on different materials/service installation certificates guarantee a good construction/installation quality • SOME: some tests or certificates guarantee execution quality • A FEW: few tests or certificates guarantee execution quality • A COUPLE: very few tests or certificates guarantee execution quality • NO: no test/certificate are conducted/provided
MAINTENANCE & MANAGEMENT	maintenance ease and accessibility, documentation for facility management
documentation for facility management	guidelines/handbooks provision for facility management (technical/technological equipment) and for construction/building elements maintenance: • YES: documentation is provided for both technical equipment and construction elements • IN PART: documentation is provided only for one of them • NO: no documentation is provided
EMS documentation	suggestions for further improvements, targets and policies, e.g.: actions on technical systems or for energy demand reduction, etc. • YES: well defined suggestions are available, including targets and motivations/explanation • IN PART: some superficial suggestions (options) are provided • NO: no suggestions are available
maintenance ease and accessibility (systems)	easy access and maintenance of technical equipment: • YES: most technical systems are easily accessible and need low-maintenance • IN PART: most technical systems are not easily accessible or need high-maintenance • NO: most technical systems are hardly accessible and need high-maintenance

CULTURAL HERITAGE	
SAFETY & REGULATORY COMPLIANCE	respect regulations on accessibility, sanitary/fire/structural/fire safety, etc.
accessibility	independent access and usability of spaces to people with handicap: • YES: accessibility level (full accessibility) • IN PART: visitability level (primary spaces and min 1 WC) • NO: adaptability level (currently not accessible without help; or accessible with certain interventions/modifications)

acoustic safety	respect for acoustic standards (prescriptions): • YES: respects current standards • IN PART: notwithstanding current regulations, but acceptable • NO: poor conditions
fire resistance	respect for fire resistance standards (prescriptions): • YES: respects current standards • IN PART: notwithstanding current regulations, but acceptable • NO: poor conditions
hygiene & health requirements	respect for hygienic standards (indoor height, available daylight, etc.): • YES: respects current standards • IN PART: notwithstanding current regulations, but acceptable • NO: poor conditions
structural & earthquake resistance	respect for earthquake-resistance standards (prescriptions) or improvement of existing conditions: • YES: respects current standards • IN PART: notwithstanding current regulations, but existing situation was/will be significantly IMPROVED • NO: notwithstanding regulations and slightly improved
LOW INVASIVITY	reduced impact on existing building elements: solutions/interventions avoid or limit alterations to characteristic settings (functional, construction and formal setting), to physical integrity or spatial perception
layout type	respect for the original layout type (space configuration/layout, volumetric layout, massing, etc.) of the building: legibility of the original scheme or re-establishment of original configuration: • ABSOLUTELY: the project re-establishes a historic asset by removing later modifications or confirms the original asset • MOSTLY: the project respects the original asset with some minor modifications • IN PART: the project partially respects the original asset (only in certain parts) • NOT ENOUGH: the project modifies the original asset, which remains legible in few parts • NOT AT ALL: the project significantly modifies the original asset, so that it is not legible anymore (new configuration)
structures	preservation of existing structural elements/materials: few substitutions, low-invasive instability treatment: • ABSOLUTELY: the project maintains almost all existing structural elements and adopts low-invasive instability solutions • MOSTLY: the project maintains most existing structural elements or adopts low-invasive instability solutions • IN PART: the project partially maintains existing structural elements or adopts quite invasive instability solutions • NOT ENOUGH: the project maintains few existing structural elements or it adopts invasive instability solutions • NOT AT ALL: the project adopts invasive or totally new structural solutions substituting existing elements
finishing & decorative elements	respect for historic finishing and decorative apparatus: preservation of recoverable elements, removal of incongruous additions, low-invasive degradation interventions • ABSOLUTELY: the project totally respects historic finishing and decorative elements • MOSTLY: the project mostly respects historic finishing and decorative elements • IN PART: the project partially respects historic finishing and decorative elements • NOT ENOUGH: the project substitutes many historic finishing and decorative elements • NOT AT ALL: the project substitutes most historic finishing and decorative elements
technical systems	use of existing technical space (compaction of technical systems), limitation of negative indoor/outdoor visual impact (camouflage): • ABSOLUTELY: the project takes advantage of existing technical spaces and limits their visual impact

	• MOSTLY: the project mostly takes advantage of existing technical spaces or limits their visual impact • IN PART: the project takes advantage of some existing technical spaces and/or it partially limits their visual impact • NOT ENOUGH: the project does not take advantage of existing technical spaces and technical systems are mostly visible • NOT AT ALL: the project does not take advantage of existing technical spaces, technical systems are well visible and unpleasant
REVERSIBILITY & ADAPTABILITY	possibility of returning to a previous condition with minor implications (limited cost, loss of original material, etc.) and/or future adaptability/modifiability
structures	adoption of reversible actions/design choices on structures: • ABSOLUTELY: the project adopts highly reversible solutions • MOSTLY: most of the adopted solutions are reversible • IN PART: a part of the adopted solutions is reversible • NOT ENOUGH: only some of the adopted solutions are reversible • NOT AT ALL: almost none of the adopted solutions are reversible
finishing & protection	adoption of reversible actions on finishing layers and materials (removable new layers with no or negligible material loss): • ABSOLUTELY: the project adopts highly reversible solutions • MOSTLY: most of the adopted solutions are reversible • IN PART: a part of the adopted solutions is reversible • NOT ENOUGH: only some of the adopted solutions are reversible • NOT AT ALL: almost none of the adopted solutions are reversible
interior partition	introduction of potentially removable interior partition with negligible consequences on finishing or other elements: • ABSOLUTELY: the project introduces only removable partition • MOSTLY: most of the added partitions are removable • IN PART: part of the added partitions are removable • NOT ENOUGH: only some of added partitions are removable • NOT AT ALL: almost none of the added partitions are removable
decorative elements	adoption of reversible actions on decorative apparatus (not modifying surface, properties or appearance): • ABSOLUTELY: the project adopts only reversible actions • MOSTLY: most of the adopted actions are reversible • IN PART: part of the adopted actions are reversible • NOT ENOUGH: only some of the adopted actions are reversible • NOT AT ALL: almost none of the adopted actions are reversible
technical systems	introduction of potentially removable or adaptable (can be modified) technical systems: • ABSOLUTELY: the project adopts highly adaptable solutions • MOSTLY: most of the adopted solutions are adaptable • IN PART: part of the adopted solutions are adaptable • NOT ENOUGH: only some of the adopted a solutions are adaptable • NOT AT ALL: almost none of the adopted solutions are adaptable
MATERIAL COMPATIBILITY	physical, chemical, aesthetic appropriateness of used materials in reference to existing situation (materials)
structures	use of appropriate materials for structural integration (see above): • ABSOLUTELY: the project adopts highly compatible solutions • MOSTLY: most of the adopted solutions are compatible or solutions are mostly compatible • IN PART: part of the adopted solutions are compatible or solutions are partially compatible • NOT ENOUGH: only some of the adopted a solutions are compatible or solutions are not so compatible • NOT AT ALL: almost none of the adopted solutions are compatible or solutions are poorly compatible

interior partition	use of appropriate materials for interior partition (see general description): • ABSOLUTELY: the project adopts highly compatible solutions • MOSTLY: most of the adopted solutions are compatible or solutions are mostly compatible • IN PART: part of the adopted solutions are compatible or solutions are partially compatible • NOT ENOUGH: only some of the adopted a solutions are compatible or solutions are not so compatible • NOT AT ALL: almost none of the adopted solutions are compatible or solutions are poorly compatible
finishing & protection	use of appropriate materials for finishing and protection layers (see general description): • ABSOLUTELY: the project adopts highly compatible solutions • MOSTLY: most of the adopted solutions are compatible or solutions are mostly compatible • IN PART: part of the adopted solutions are compatible or solutions are partially compatible • NOT ENOUGH: only some of the adopted a solutions are compatible or solutions are not so compatible • NOT AT ALL: almost none of the adopted solutions are compatible or solutions are poorly compatible
decorative elements	use of appropriate materials for integrating decorative elements (see general description): • ABSOLUTELY: the project adopts highly compatible solutions • MOSTLY: most of the adopted solutions are compatible or solutions are mostly compatible • IN PART: part of the adopted solutions are compatible or solutions are partially compatible • NOT ENOUGH: only some of the adopted a solutions are compatible or solutions are not so compatible • NOT AT ALL: almost none of the adopted solutions are compatible or solutions are poorly compatible
RECOGNISABILITY	possibility to distinguish new components from original e.g.: different form, texture, colour, material, etc.
new elements (structure/partition)	clear legibility of new added structural/partition elements: • ABSOLUTELY: new additions are always quickly visible • MOSTLY: most additions are quickly visible • IN PART: part of the additions are quickly visible or additions are not so quickly visible • NOT ENOUGH: only few additions are quickly visible or additions can be recognised only through accurate observation • NOT AT ALL: additions cannot be clearly identified; the solutions are too imitative (falsification)
gap filling / reconstructions (dec.el.)	clear legibility of new added parts (reconstructions and integrations) of decorative apparatus: • ABSOLUTELY: new additions are always quickly visible • MOSTLY: most additions are quickly visible • IN PART: part of the additions are quickly visible or additions are not so quickly visible • NOT ENOUGH: only few additions are quickly visible or additions can be recognised only through accurate observation • NOT AT ALL: additions cannot be clearly identified; the solutions are too imitative (falsification)

USER COMFORT & PERCEPTION	
INDOOR COMFORT	care for user's comfort conditions related to hygrothermal, visual, acoustic perception and air quality
hygrothermal comfort	care for indoor hygrothermal comfort conditions: • YES: room/zone-controlling is (also) available (user setting); HVAC is available (heating and air conditioning (AC)) • IN PART: central HVAC, partially controllable; or zone control for heating without AC • NO: central heating only (no AC)

indoor air quality	care for good indoor air quality and ventilation: • YES: automatic control (mechanical ventilation) • IN PART: manual ventilation • NO: scarce possibility of manual ventilation
acoustic quality / comfort / privacy	care for comfortable level of acoustic quality and privacy: • YES: units are well isolated • IN PART: noise is acceptable • NO: noise is not acceptable, no acoustic privacy
visual comfort	care for sufficient light (artificial) and glare prevention: • YES: indoor spaces are adequately illuminated • IN PART: some spaces are not well-illuminated • NO: most spaces are insufficiently illuminated
PERCEPTUAL QUALITY	indoor design quality, visual privacy, exterior views, etc.
indoor design quality	pleasant and comfortable design of indoor spaces that also give sensation of personal safety, order, easy orientation: • YES: indoor spaces are comfortable and pleasant • IN PART: some spaces are unpleasant (too narrow, chaotic, etc.) • NO: most spaces are unpleasant
exterior views from inside (perceptual comfort)	availability of nice views of the outside: • YES: most of the building offers nice views of the outside • IN PART: only a part of the building offers nice views • NO: most spaces don't have a nice view of the outside
visual privacy	care for indoor visual privacy (position, shading systems, etc.); consider only rooms or uses that request such privacy (i.e.: residential units rather than shops): • YES: the building is adequately shaded from outside viewers • IN PART: part of the building does not provide comfortable visual privacy • NO: most of the building does not guarantee comfortable visual privacy (is visible from the outside)

The Environmental Sustainability Branch

Environmental sustainability is represented by the following categories:

- **Energy efficiency:** energy efficient project, that reduces primary energy demand and takes advantage of solar supplies;
- **Ecological impact:** reduction of the project's impact on the environment through the adoption of green technologies and materials, pollution reduction and a rational management of the construction site;
- **Environmental quality:** enhancement of the environmental quality through the improvement of external green areas, by supporting eco-mobility and accessibility and avoiding negative impacts on local context.

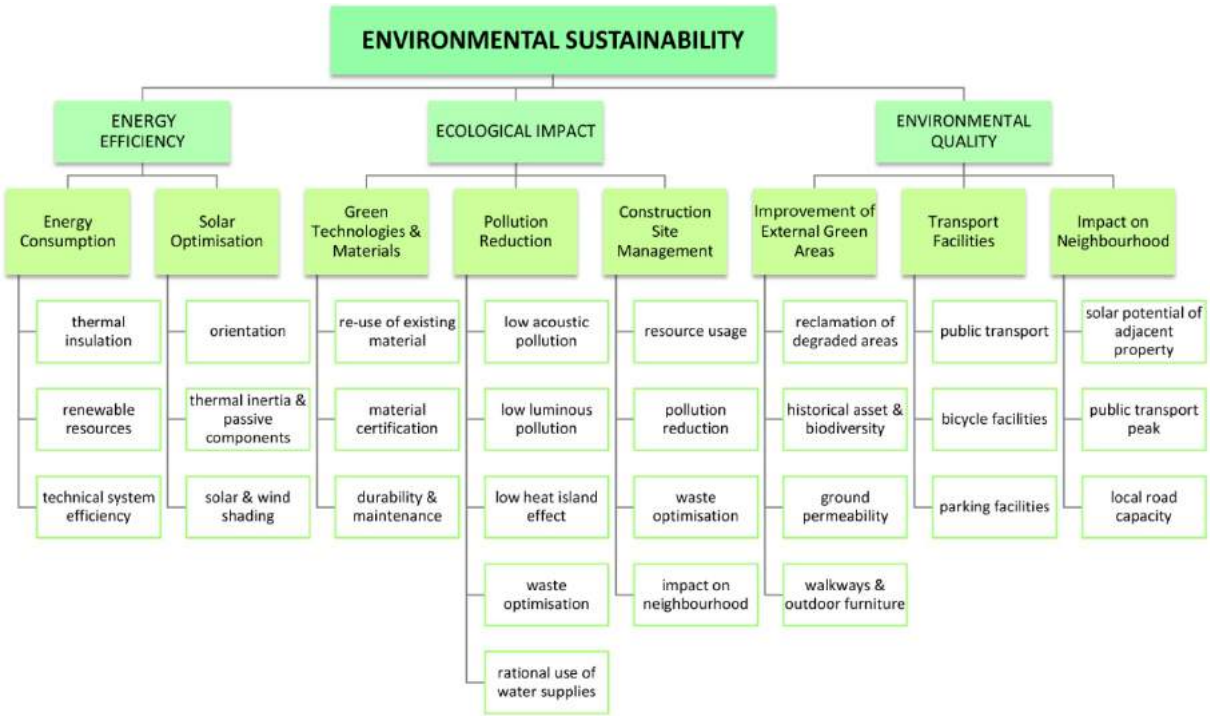


Figure 27: Environmental Sustainability Branch

The following table collects the description of parameters and grouping at the Aspect and the Options & Alternatives levels.

Table 21: Environmental Sustainability Parameters

ENERGY EFFICIENCY	
ENERGY CONSUMPTION	reduction of primary energy demand trough thermal insulation, renewable resources or systems' efficiency
thermal insulation of the building envelope	thermal insulation of the building envelope (coating or internal insulation of the whole envelope or in part): • ABSOLUTELY: the whole building envelope is thermally insulated • MOSTLY: most of the building envelope is thermally insulated • IN PART: part of the building envelope is thermally insulated • NOT ENOUGH: only few surfaces/elements of the building envelope are thermally insulated • NOT AT ALL: the building envelope is not insulated

renewable resources	satisfaction (even partial) of energy demand with systems of energy production from renewable resources (photovoltaic, geothermal, eolic system, solar district heating, etc. even if energy is not produced within the plot): • ABSOLUTELY: the building energy demand is almost completely covered with "green" energy or all possibilities of energy production from renewable resources within the plot are used • MOSTLY: most of the building energy demand is covered with "green" energy or most possibilities of green energy production within the plot are used • IN PART: part of the building energy demand is covered with "green" energy or part of the possibilities of green energy production within the plot are used • NOT ENOUGH: a small part of the building energy demand is covered with "green" energy and most possibilities of green energy production within the plot are NOT used • NOT AT ALL: the building energy demand is covered with non-renewable energy
technical system efficiency	adoption of efficient technical systems in distribution and emission or presence of regenerators (energy-saving illumination and electric supplies, high performing HVAC systems): • YES: adopted technical systems are highly efficient or the building is provided with a regenerator • IN PART: only some technical systems are efficient • NO: technical systems are not so efficient
SOLAR OPTIMISATION	advantages from solar supplies, orientation and solar/wind control
orientation	definition of space purposes in reference to optimal orientation for daylight use (natural lighting): • YES: activities were defined on the basis of daylight preferences (most activities are provided with optimal daylight conditions) • IN PART: only some activities have optimal daylight conditions • NO: few or almost none of the activities have optimal daylight conditions
thermal inertia and passive components	adequate level of thermal inertia and time shift (optimal 11-13 hours) or passive solar design solutions (heat collectors, passive stack ventilation): • YES: passive solar design or ideal time shift (11-13 hours) • IN PART: time shift of 8-10 hours • NO: no passive solar design and time shift of 0-7h or 17-24h
solar and wind shading	control of solar radiation and wind through architectural (e.g.: brise-soleil) or natural barriers (trees, hill, etc.): • YES: solar radiation or wind is adequately shielded with natural or architectural elements • IN PART: solar radiation or wind is only in part shielded (not everywhere despite it would be necessary) • NO: no (or almost none) solar or wind shield are provided

ECOLOGICAL IMPACT	
GREEN TECHNOLOGIES & MATERIALS	reuse of existing materials, origin and composition certification/labelling
reuse of existing material	reuse of existing building materials & finishing (remove and position again or re-use in a different way): • ABSOLUTELY: all existing material that could be reused was maintained • MOSTLY: most of reusable existing materials were maintained • IN PART: part of reusable existing materials were maintained • NOT ENOUGH: a small part of reusable existing materials were maintained • NOT AT ALL: almost none of reusable existing materials were maintained
material certification	use of materials that are reusable/recyclable in the future or materials provided with certification of origin & low embodied energy (bio-based or from recycled material, local origin, local transport) / low toxicity: • ABSOLUTELY: almost all newly adopted materials are certified or recyclable • MOSTLY: most of the newly adopted materials are certified or recyclable

	• IN PART: part of the newly adopted materials are certified or recyclable • NOT ENOUGH: a small part of the newly adopted materials are certified or recyclable • NOT AT ALL: almost none of the newly adopted materials are certified or recyclable
durability & maintenance	use of materials with long durability and easy maintenance (e.g. cleaning): • YES: adopted materials guarantee long durability and request low maintenance (only easy, ordinary maintenance) • IN PART: adopted materials guarantee a medium durability or request more maintenance • NO: adopted materials have a scarce durability or request constant / frequent maintenance
POLLUTION REDUCTION	limitation of acoustic and luminous pollution, heat island effect, waste production and water consumption
low acoustic pollution	limitation of indoor to outdoor noise and indoor noise from technical systems (in action): • YES: noise from indoor activity cannot be heard outside and technical systems are silent or adequately insulated • IN PART: noise from indoor activity or technical systems can be slightly heard • NO: noise from indoor activity or technical systems in function can be distinctly heard (annoying)
low luminous pollution	provision of automatic lighting systems or external limitations: • YES: external lighting is provided with sensors and timer and illumination is adequate (intensity) and target-oriented (e.g.: building façade only, no dispersion) • IN PART: external lighting is provided only with a timer, illumination is not so adequate nor well oriented (partial dispersion) • NO: external lighting is too intense and dispersive
low heat island effect	choice of certain materials and light colours for roofing or external paving that prevent heat island effect: • YES: both roofing and paving are light/bright (do not absorb excessive heat) • IN PART: only one of them is light or both are medium-light • NO: both surfaces are dark and absorb heat
waste optimisation	reduction of waste amount DURING BUILDING OPERATION by recycling materials (arranges systems/containers for separate materials (collective bins, compost bin, etc.)) or using them for energy production (e.g.: agreement with energy producers for waste collection): • YES: the project encourages recycling through the adoption of special collecting systems/bins or uses waste for energy production • IN PART: the project does not adopt particular measures for recycling, but the municipal administration encourages/obligates it • NO: both the project and municipality do not consider recycling
rational use of water supplies	reduction of water consumption for external and other uses (WC, cleaning, wash machine, etc. (non potable purposes only)) by grey water collection or rainwater harvesting: • YES: potable water demand is significantly reduced thanks to the adoption of water-collection systems • IN PART: potable water demand is slightly reduced thanks to the adoption of water-collection systems • NO: potable water is used for all purposes (no collection systems)
CONSTRUCTION SITE MANAGEMENT	limitation of the ecological impact and inconvenience <u>during</u> construction works
resource usage	limitation of ground, water, energy use during construction: • YES: resource usage is limited as much as possible • IN PART: only the usage of certain resources is limited • NO: no limitations are considered
pollution reduction	prevention of luminous and acoustic pollution, dust production, soil and water contamination during construction: • YES: all/many precautions are adopted to minimise pollution • IN PART: only some measures are adopted to minimise pollution • NO: no particular measures are adopted to minimise pollution

waste optimisation	limitation of waste production during construction: no surplus – preparation of effectively needed quantities, recycling of extra-materials (re-use for other purposes or in future works) • YES: waste production is limited to the minimum possible • IN PART: waste production is partially limited (could do better) • NO: no measures are adopted to minimise waste production
impact on neighbourhood	limitation of negative impacts of construction works on local viability, residents (annoyance) and commercial facilities by adopting secondary solutions (e.g.: deviations, etc.) or by concentrating the annoyance to a short period: • YES: secondary solutions are provided to avoid negative impacts on the neighbourhood and annoyance is limited to a short period (as much as possible) • IN PART: no secondary solutions are provided for short inconvenience or medium-long-term inconveniences are solved with secondary solutions • NO: there are long-term inconveniences or no secondary solutions are provided for medium-long inconveniences

ENVIRONMENTAL QUALITY	
IMPROVEMENT OF EXTERNAL GREEN AREAS	reclamation of degraded areas, biodiversity, ground permeability, etc.
reclamation of degraded areas	transformation of degraded areas into green surfaces (improvement): • YES: almost all degraded areas within the plot are transformed into green surfaces • IN PART: part (ca. half) of degraded areas within the plot are transformed into green surfaces • NO: a minimum part or no degraded areas within the plot are transformed into green surfaces
historical asset and biodiversity	re-establishment of a historical arrangement (past condition), preservation or enhancement of existing biodiversity: • YES: green areas are rearranged to a historical setup or existing biodiversity is respected or enhanced • IN PART: biodiversity is partially preserved, historical asset is rearranged only in a limited portion of green areas • NO: biodiversity is scarcely preserved, there is not historical rearrangement
ground permeability	preservation or increase of permeable areas: • YES: permeable surfaces are maintained or even enhanced • IN PART: permeable surfaces are minimally reduced • NO: permeable surfaces are rather reduced
walkways and outdoor furniture	provision of walkways and adequate furniture in external areas: • YES: external areas are well organised and equipped • IN PART: external areas are well organised (walkways) and only partially equipped • NO: external areas aren't equipped and well organised
TRANSPORT FACILITIES	green transport support (eco-mobility) and parking services
public transport	improvement or promotion of public transport service (or car sharing services): • YES: the bus stop is close (<300 m on foot) or there are special agreements with public transport or car sharing services • IN PART: the bus stop is not far (300-600 m on foot) • NO: the nearest bus stop is more than 600 m far (on foot)<1km
bicycle facilities	improvement of bicycle trails and facilities, such as bike-sharing, stands, etc.: • YES: there are bike paths and bike-sharing points nearby (<200 m), the building has also bicycle stands(or other equipment that promote cycling) • IN PART: bike paths are available quite close (200-500 m), there are bike-sharing points nearby OR the building provides bicycle stands (or other equipment) • NO: there are no bike paths nearby, nor bike-sharing points or bicycle stands (or other equipment)

parking facilities	sufficient amount of car parks; reserved places for carpool, low-emission vehicles or spaces with alternative fuel station are recommendable: • YES: the parking is definitely sufficient for the building users and it has some reserved places for eco-mobility users • IN PART: the parking capacity is generally sufficient (average number of users), eco-mobility is not promoted • NO: the parking might be/is insufficient, eco-mobility is not promoted
IMPACT ON NEIGHBOURHOOD	permanent impact on solar energy potential of adjacent properties, road and transport capacities
solar potential of adjacent property	prevention of negative impacts on daylight conditions and solar energy potential of adjacent properties: • YES: the project does not affect adjacent properties (status quo) • IN PART: the project has little (limited) negative effects on adjacent properties • NO: the project negatively affects adjacent properties
public transport peak	prevention of overloading public transport during peak hours with the building user population: • YES: the building users do not overload public transport • IN PART: the building users might sometimes overload public transport • NO: the building users certainly cause frequent overload of public transport
local road capacity	prevention of exceeding local road capacity with the building user population: • YES: the building users do not overload local infrastructure • IN PART: the building users might sometimes overload local infrastructure • NO: the building users certainly cause frequent overload of local infrastructure

The Economic Sustainability Branch

The economic sustainability is not as articulate as the previous two domains, but it gathers all the main aspects that contribute to a successful project, which are, on one hand, the financial feasibility and on the other the less tangible sphere of benefits. More specifically, it is composed of the lifecycle cost coverage, profitability, risk and utility (Figure 28).

Table 22: Economic Sustainability Parameters

LCC COVERAGE	
verification of cost coverage during the entire life of the building; usually a cash-flow analysis is applied to life cycle costing and expected incomes	
FINANCEABILITY	coverage of initial cost – that are: demolition/reclamation, purchase, transformation cost (construction, professional, licence, loan, marketing costs and developer profit) – considering also self-financing opportunities, public subsidies or tax breaks and private investments: • ABSOLUTELY: (almost) all initial costs are covered before the building renovation has started • MOSTLY: most initial costs are covered until the building renovation is completed • IN PART: initial costs are partially covered; the building renovation should be divided in two different phases (consecutive batches) • NOT ENOUGH: a small part of initial costs is covered, the building renovation should be divided in three or more phases (consecutive batches) • NOT AT ALL: most part of initial costs is not covered
OPERATING COST COVERAGE	cost amount (low, medium, high operating cost) and self-financing opportunity - coverage of operating, management and maintenance cost thanks to the new building activity or external funding (public or private funds/investments, etc.): • ABSOLUTELY: self-financing opportunity and low operating cost • MOSTLY: self-financing opportunity and high operating cost • IN PART: co-financing(self+external) of medium operating costs • NOT ENOUGH: external funding and low operating costs • NOT AT ALL: total dependency on external funding and high operating costs

PROFITABILITY
considers expected profitability for investors or probability of renting/selling property: verification of a positive expected profit based on marketability conditions, where market viability is tested through market analysis, that considers potential demand and competitors, occupancy level of similar assets in the area and cost/rent affordability in reference to potential buyers/local population. This parameter should be left out ("don't know" option) if the user/DM is a public subject and the project is meant for public use. • ABSOLUTELY: strong profitability/marketability conditions – high demand and few competitors, high occupancy rate • MOSTLY: good profitability/marketability conditions – good demand and few competitors, good occupancy rate • IN PART: satisfying profitability/marketability conditions – sufficient demand and some competitors, occupancy rate is quite good • NOT ENOUGH: scarce profitability/marketability conditions – rather poor demand and some competitors, occupancy rate is quite low • NOT AT ALL: weak profitability/marketability conditions – low demand with or without competitors, low occupancy rate

LOW RISK
critical assessment of the assumptions that have been made and on which depends the success of the whole operation (sureness of hypotheses); possibly a risk and sensibility analysis is carried out to consider riskiness as well as value trend in time (stability or increase of the property value) • ABSOLUTELY: low riskiness: assumptions are very likely to be true • MOSTLY: medium-low riskiness: assumptions are likely to be true • IN PART: medium riskiness: some assumptions might be true, others are not so certain • NOT ENOUGH: medium-high riskiness: many assumptions are risky (based on many variables) • NOT AT ALL: most assumptions are risky, depending on a lot of variables

UTILITY
consideration of other benefits or positive externalities that the operation might imply; cost-benefit analysis to evaluate indirect benefits on context, such as: economic benefits for local community, spreading of new activities, increase of adjacent property values, etc.: • ABSOLUTELY: high utility grade – the project implies great benefits and positive externalities • MOSTLY: medium-high utility grade – the project implies many benefits and positive externalities • IN PART: medium utility grade – the project implies some benefits and positive externalities • NOT ENOUGH: medium-low utility grade – the project implies few benefits and positive externalities • NOT AT ALL: low utility grade – the project implies almost no benefits or positive externalities

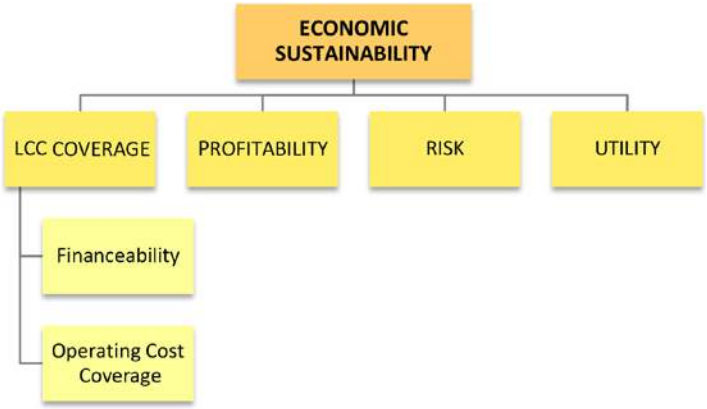


Figure 28: Economic Sustainability Branch

In order to adequately verify the economic sustainability of a project proposal, several economic-financial analyses should be carried out. However, in order to facilitate the application of the present evaluation tool to early planning stages too, the assessment of the economic performance is not based on quantified values, but rather on more general conditions and qualitative judgements.

Interpretation of SUS Results

The sustainability model provides a final indicator of sustainability, which summarises the partial results in the three macro-categories: the socio-cultural sustainability area, the environmental and the economic performances. The result is a value between 0 and 1, which is easy to compare to an ideal maximum (equal to 1). The same occurs at all nodes of the sustainability tree, so it is rather simple to find the project's weak points.

The model is not meant to certify the level of sustainability and for this reason it does not transform numerical values in grades. Nevertheless, a threshold level of sustainability was set to 0,500/1,000, which must be achieved in all three macro-categories – respecting Elkington's triple-bottom line – in order to guarantee that the project is truly "sustainable".

However, since the model must fit different planning stages with a different number of pending answers, its outputs are not all equally reliable: on account of this, the "completion %" is automatically calculated on the basis of the number of answers provided in reference to the total requested (excluding the "NP" entries). Therefore, the reliability of the model's results is directly proportional to the analysis' accomplishment (see also: Sustainability analyses of case studies).

4 APPLICATION TO CASE STUDIES

This part presents an application of the method on a selection of case studies from the region of Gorizia and Nova Gorica. The first chapter explains how the examples were chosen (4.1), while in the second (4.2) the six case studies are presented following the planning phase order (from the early planning to the final proposal). Each case study will open with a brief presentation of the subject and the reference project; the completed Building ID Card will follow with some iconographic material, then the Vocationality model and the Sustainability analysis with a short comment on their results.

4.1 SELECTION OF THE CASE STUDIES FROM THE REGION OF GORIZIA AND NOVA GORICA

Since the new method should follow the project definition *in itinere*, the testing was carried out at different project stages, including: preliminary projects or feasibility studies, intermediate project (intermediate definition level for procurement and tender phase), final project – detailed project for construction or post-completion project (as-built project, post-practical completion phase).

Study cases were initially researched within a list of abandoned or misused public buildings[102] that was prepared at the beginning of the doctoral research programme in 2013[103] and that was later modified (see Table 24). Some buildings were originally public buildings that were later sold to private investors, but have not been re-used yet;[104] others are currently used (after indoor renovations) and a small number of cases was restored in the last five years. All the others are currently abandoned, waiting for financial funds and, sometimes, for ideas as well.

So far most of the buildings listed in Table 24 have not been provided with projects or feasibility studies; as a consequence, two case studies had to be found in closer municipalities, extending the reference territory from the two municipalities to the "province" of Gorizia and Nova Gorica (območje). On the contrary, the vocationality model – which does not depend on the presence and accuracy of re-use projects – was tested on several cases from the aforementioned list, considering both different building type and location. However, in order to provide an example of application of the whole procedure, six case studies will be here presented, selected on the basis of their planning stage and country:

Table 23: Case Studies in Reference to Planning Stage

PLANNING STAGE	ITALY	SLOVENIA
Preliminary	Villa Louise – Gorizia	Vila Laščak / Rafut – Nova Gorica (IDZ)[105]
Intermediate	Gradisca Castle: Palazzo del Capitano – Gradisca d'Isonzo	Vila Laščak / Rafut – Nova Gorica (PGD)[106]
Final or post-completion	Ex O.P.P. (Psychiatric hospital complex): Former food preparation building, now Mental Health Centre – Gorizia	Vila Vipolže – Goriška Brda

[102] Buildings of public property or similar, as for instance: ecclesiastical property or private associations/foundations that offer public services.
[103] The aim of the census was to show the amount of dismissed public buildings and to prove the necessity of re-use actions, or better the importance of focusing on re-use strategies rather than new construction.
[104] Former tobacco factory, train hangar and water tower.
[105] Idejna Zasnova (IDZ) – "concept" corresponds to a preliminary project feasibility study.
[106] Projekt za Gradbeno Dovoljenje (PGD) – is the intermediate definition level for procurement and tender phase.

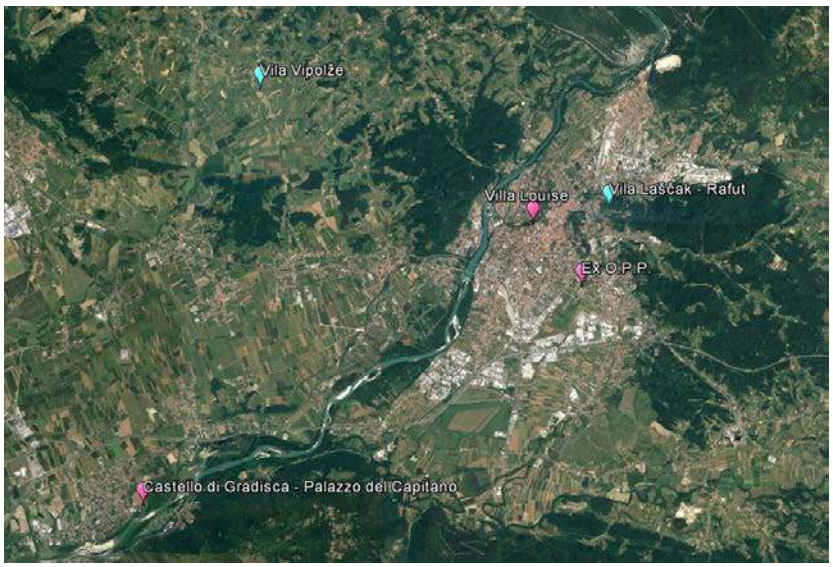


Figure 29: Localisation of Study Cases (Google Earth)

In order to adequately[107] complete the sustainability evaluation at the intermediate planning stage, both the Gradisca Castle and vila Laščak were tested considering together their preliminary and intermediate proposals, as if they were part of the same project, for they are not in contrast[108].

[107] Both intermediate projects (for Gradisca's castle and vila Laščak) have many gaps, caused by insufficient economic funds that reduced the whole operation to a mere safeguard project. Therefore, none of them define a new use for the building and, as a consequence, many formal and technical choices are still pending. On the contrary, some hypotheses on such development were made in earlier projects, developed by different people and in different periods, that were though abandoned due to unfinanceability.

[108] In case of contradiction during the evaluation of specific sustainability criteria, the more recent project will prevail.

Table 24: List of Abandoned or Mis-used Public Buildings in Gorizia and Nova Gorica

SUBJECT			LOCATION			CADASTRAL DATA				OTHER INFORMATION
COUNTRY	MUNICIP.	BUILDING	CITY / TOWN / LOCALITY	ADDRESS	CIVIC No°	CAD. MUNICIPALITY	MAP	CAD. UNIT	CURRENT PROPERTY	NOTES
ITA	GO	Casermette (military barracks)	Gorizia	Via Brigata Etna, via del Monte Santo	\	Salcano	18	.532-.564	Comune di Gorizia	
ITA	GO	Residential building loc. Straccis	Gorizia	Loc. Straccis	14	Contado	8	.59/2,3	Comune di Gorizia	
ITA	GO	Residential building via Battistig 4-6	Gorizia	Via Battistig	4, 6	Contado	8	.480	Comune di Gorizia	
ITA	GO	Residential building via Gallina 29	Gorizia	Via Gallina	29	Contado	8	.479	Comune di Gorizia	
ITA	GO	Residential building via Gallina 31	Gorizia	Via Gallina	31	Contado	8	.478	Comune di Gorizia	
ITA	GO	Residential building via Gallina 33	Gorizia	Via Gallina	33	Contado	8	.477	Comune di Gorizia	
ITA	GO	Ex rimessa dei tram (former tram garage)	Gorizia	Piazzale Saba	2	Contado	14	.464	Comune di Gorizia	
ITA	GO	Ex bagni pubblici (public toilets, lavatories)	Gorizia	Via Cadorna	26	Gorizia	9	.1151	Comune di Gorizia	
ITA	GO	Ex casa custode Valletta del Corno (resid.b.)	Gorizia	Via Italico Brass	11	Gorizia	14	.3967	Comune di Gorizia	
ITA	GO	Ex dazio (duty office)	Gorizia	Via Boccaccio	6	Gorizia	15	.1897	Comune di Gorizia	
ITA	GO	Ex scuola Pitteri (school)	Gorizia	Via Cappuccini	10	Gorizia	18	.1565/1	Comune di Gorizia	
ITA	GO	Ex valico del Rafut (state border building)	Gorizia	Via del Rafut	32	Prati	8	.325	Comune di Gorizia	RENOVATED: Social economy agency
ITA	GO	Ex valico di San Pietro (state border b.)	Gorizia	Via Vittorio Veneto	187,189,191,193	Gorizia	26	.2232	Comune di Gorizia	
ITA	GO	Casa Rassauer (residential b.)	Gorizia	Borgo Castello	14	Gorizia	18	.684	Fondazione Coronini Cronberg	
ITA	GO	Villa Frommer	Gorizia	Via del Monte Santo	61	Gorizia	10	.1/41 e .3418/4 (parco)	Fondazione Coronini Cronberg	
ITA	GO	Villa Louise - Palazzo Studeniz	Gorizia	Largo Culiat; via I. Brass	5, 6, 7; 1,3,5	Gorizia	14	.900/1	Fondazione Coronini Cronberg	
ITA	GO	Residential building Piuma	Gorizia	Via Ponte del Torrione	1, 3	Piuma	10	4699/2	Regione Autonoma F.V.G.	
ITA	GO	Residential building via Ascoli	Gorizia	Via Ascoli	16	Gorizia	12	.293,.295	A.T.E.R.	
ITA	GO	Ex collegio Filzi (former boarding school)	Gorizia	Via Pola	5, 5/a	Contado	20	.559/2	A.T.E.R.	
ITA	GO	Residential building via Mazzini	Gorizia	Via Mazzini	7	Gorizia	18	.981/2	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex O.P.P. (psychiatric hospital complex) - cucina (food prepar.building)	Gorizia	Via Vittorio Veneto	174	Gorizia	26	.1949	A.A.S. 2 "Bassa Friulana-Isontina"	RESTORED: Mental Health Centre
ITA	GO	Ex O.P.P. - C.T. e lavanderia (laundry)	Gorizia	Via Vittorio Veneto	174	Gorizia	26	.1952	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex O.P.P. - padiglione del lavoro (production b.)	Gorizia	Via Vittorio Veneto	174	Gorizia	26	.1959	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex O.P.P. - tipografia (typography)	Gorizia	Via Vittorio Veneto	174	Gorizia	26	.1956	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex ospedale civile (former civil hospital)	Gorizia	Via Vittorio Veneto	153	Gorizia	23,26	.2112	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex sanatorio (former pneumologic hospital)	Gorizia	Via Vittorio Veneto	153	Gorizia	23	.1929	A.A.S. 2 "Bassa Friulana-Isontina"	
ITA	GO	Ex sala del cinema Stella Matutina (cinema)	Gorizia	Via Nizza	36	Gorizia	17	.1739	Università di Udine	
ITA	GO	San Giuseppe (accomodation b.)	Gorizia	Via Vittorio Veneto	74	Gorizia	22	.1089/2,(517/1)	Beni ecclesiastici	
ITA	GO	Ex Banca d'Italia	Gorizia	Via Codelli	11	Gorizia	17	.1642/1	Banca Italia Società anonima (Rm)	
ITA	GO	Ex I.N.A.M./Provveditorato	Gorizia	Via Leopardi; Via Nievo	6; 1	Gorizia	14	.1667	Ligestra due s.r.l. (Rm)	
ITA	GO	Ex manifattura tabacchi (tobacco factory)	Gorizia	Viale XX Settembre; Via Torriani	59, 61; 21	Contado	2	1015/1, 2; 3560	Sport Garden 90 s.r.l. (Rm)	SOLD: private property
SLO	NG	Mejni prehod Erjavčeva ul. (state border b.)	Nova Gorica	Erjavčeva ulica	51	2304 Nova Gorica	2414	1507/1	Republika Slovenije	RE-USED: info point
SLO	NG	Mejni prehod Rožna dolina (state border b.)	Nova Gorica	Vipavska cesta	1	2306 Rožna dolina	545	224	Republika Slovenije	DEMOLISHED
SLO	NG	Vila Laščak	Rafut	Kostanjeviška cesta	16	2304 Nova Gorica	2067	1657/8	Republika Slovenije	
SLO	NG	Mejni prehod Solkan (state border b.)	Solkan	Cesta IX. Korpusa	101	2304 Nova Gorica	2425	22	Republika Slovenije	
SLO	NG	Železniška remiza (train hangar)	Solkan	Prvomajska ulica	56a	2304 Nova Gorica	25	21/21	Erste Group Immorent Ljubljana	SOLD: private property
SLO	NG	Vodni stolp (water tower)	Solkan	Prvomajska ulica	62	2304 Nova Gorica	21	21/20	Erste Group Immorent Ljubljana	SOLD: private property
SLO	NG	Vila Lenassi	Solkan	Cesta IX. Korpusa	98	2303 Solkan	52	2680	Stanovanjski sklad mestne občine	IN USE: After-school activities
SLO	ŠV	Coroninijev dvorec (villa)	Šempeter	Trg Ivana Roba	3	2315 Šempeter	637	2772/8	Občina Šempeter (central building), RS (wings)	RENOVATED: Municipality of Šempeter
SLO	ŠV	Železniška postaja (railway station)	Šempeter	Cvetlična ulica	48	2315 Šempeter	1015	3396/1	Public - železniška infrastruktura	

4.2 APPLICATION AT THE PRELIMINARY PLANNING STAGE

4.2.1 Villa Louise, Gorizia

Introductory information

Villa Louise is a Venetian villa from the XVII Century with a beautiful park on the back. Located in the city centre of Gorizia it is today owned by the Coronini Cronberg Foundation. Its magnificent appearance was achieved during the 1750 enlargement, but is nowadays compromised by the park's growing vegetation and severe rainwater infiltrations, that recently caused the roof's partial collapse. Since 2013 the University of Trieste – Department of Architecture has promoted a series of actions to sensitise Gorizia's citizens on this heritage asset: an exhibition of re-use projects for the villa lead to the villa's temporary opening to public together with a collection of signatures aimed at fund-raising. The villa was eventually included in an investment programme that will turn it into a business incubator (start-up centre).

Project presentation

The sustainability model was applied to the feasibility study of this new project that was developed by prof. Sergio Pratali Maffei and submitted at the end of 2015. Since the project definition will be contracted out, the proposal is at an early planning stage, when most sustainability parameters have not been determined yet.

The main objective of the re-use plan is to intervene on the causes of degradation and to recover all characteristic elements in accordance with the principle of "minimum intervention"[109] and by respecting the patina of time.[110] In addition to the restoration and conservations actions for the preservation of the villa, the project should also guarantee a comfortable use of spaces and the cost coverage of maintenance and operation costs.

The idea is to create a business incubator for cultural start-ups that would cooperate with the existing ones in Udine, Trieste and Pordenone. In detail, the villa will house some collective spaces for group activities or meetings – mainly in the central part – and some private working areas in the wings. An info point will be accessible directly from the street in the front west wing, while some apartments for temporary accommodation of guests is located in the eastern wing. The secondary building will host some exhibition rooms on the street front and a handcraft laboratory on the backside, while on the first floor there will be an apartment for the custodian. The main court in front of the facade will be private and meant for start-up activities, whereas all the beautiful park will be open to public, except for the small area dedicated to the green parking for the villa's occupants.

Since the initial investment is not sufficient to cover the execution costs for the whole project, it will be divided into two consecutive batches, where priority will be given to the villa preservation and the activation of the new business incubator.

In detail, the following interventions are planned:

- general actions for earthquake-resistance improvement;
- general actions to meet fire safety requirements;
- general actions to guarantee full accessibility;
- substitution of ground-floor slabs with better performing solutions and preservation of historic flooring;
- substitution of roofs by guaranteeing thermal insulation and impermeability;
- check-up of rainwater disposal system and limited substitutions with new copper elements;

[109] The principle of minimum intervention limits the actions to those that are strictly necessary (number and type of actions as well as their extent), optimising cultural and economic resources.

[110] This approach respects the building history and avoids the creation of false historical subjects (fabrication of history); namely, it satisfies the "recognisability" criterion.

- ordinary maintenance of facades and preservation of finishing layers;
- check-up of external windows and improvement of thermal insulation capacity;
- conservative restoration of indoor decorative elements;
- creation of a technologic station and technical system distribution;
  other intervention referred to the new purpose (creation of toilets etc.)

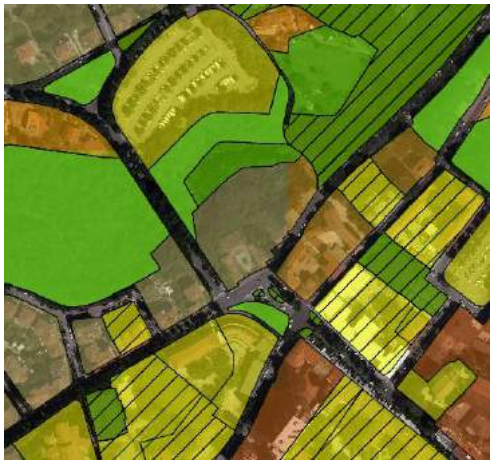
Knowing Phase

Iconographic material

LOCATION: AERIAL VIEWS, TOWN ZONING PLAN, CADASTRAL MAP

Aerial View of Villa Louise in Gorizia (Google Earth)

Aerial View of Villa Louise in Gorizia (Bing Maps)



Town Zoning Plan Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

Cadastral Map Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

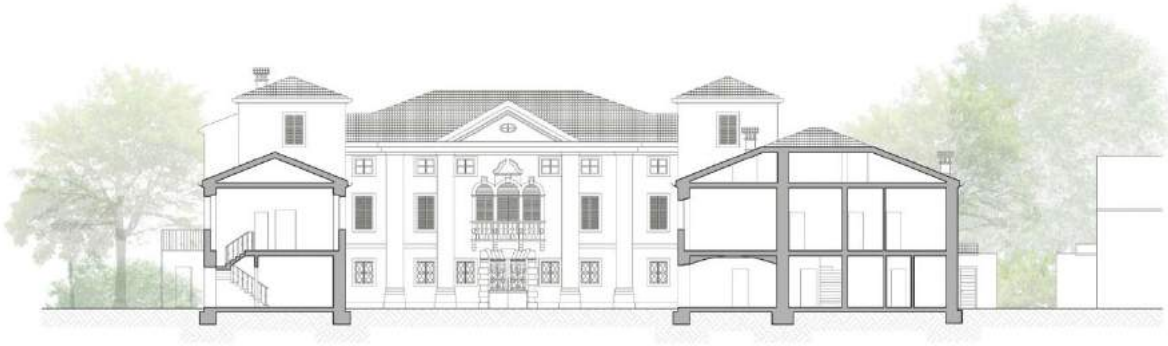
PAST SITUATION: ARCHIVAL MATERIAL (PROJECTS, PHOTOS, DRAWINGS, ETC.)

Plan of the Smart Family Property (No Date)
(ASG, Archivio storico Coronini Cronberg, serie Atti e Documenti, b.398, f.1184)

Cropped Image of Villa Louise in the 1960s
(original photo by Lazzaro)
(Fototeca dei Musei Provinciali di Gorizia, E0721)

CURRENT SITUATION: DRAWINGS, FINISHED PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)

Left: Situation plan; Below: Cross-section and Main Facade
(Lombardi, 2012)



EXTERIOR PICTURES

View from the Court; Outside View from the Loggia; Overgrown Facade on the Back (Lombardi, September 2012)

INTERIOR PICTURES

Main Staircase; Interior Wall Paintings; Attic (Lombardi, September 2012)

FUTURE PROJECTS: DRAWINGS, SKETCHES, PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)

Villa Louise: Project for a Business Incubator: Functional Layout (Lombardi & Pratali Maffei, 2015)

BUILDING ID (PART 1) — Villa Louise

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	Villa Louise, Palazzo Studenitz
	CURRENT PROPERTY:	Fondazione Coronini Cronberg
	MANAGER AUTHORITY/SITE MANAGER:	Fondazione Coronini Cronberg
	TYPE:	suburban villa
	STYLE:	venetian villa
	YEAR/PERIOD OF CONSTRUCTION:	1676 and later additions
	AUTHOR/DESIGNER:	unknown
	ORIGINAL USE/FUNTION:	private residence
	ACTUAL USE/FUNCTION:	abandoned
	CONSERVATION STATUS:	mediocre-bad
LOCATION	*NATION:*	Italy (IT)
	MUNICIPALITY:	Gorizia
	CITY/TOWN/LOCALITY:	Gorizia
	ZIP CODE:	34170
	ADDRESS & CIVIC No°:	Largo Culiat 5, 6, 7; via Brass 1, 3, 5; viale Oriani 2
	COORDINATES:	45° 56' 40'' N; 13° 37' 01'' E; OR 2412805, 5088855 (x, y)
	ALTITUDE MSL [m]	75
	CLIMATIC ZONE [DD]:	2333
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	E098 - Gorizia
	CADASTRAL MAP/SUBJECT No°:	14
	PARCEL/CAD. UNIT:	.900/1 (villa); 3612 (park)
NUMERICAL DATA - site	*LOT AREA [m^2]:*	8525
	COVERED AREA [m^2]:	1027
	UNCOVERED AREA [m^2]:	7498
	BUILT AREA [m^2]:	1027,00
NUMERICAL DATA - building	*No° OF STOREYS ABOVE GROUND:*	2+1
	No° OF STOREYS UNDERGROUND:	1
	TOTAL STOREY No°:	4
	PLANT AREA [m^2]:	1027
	AVERAGE HEIGHT [m]	12,00 (central volume); 8,50 (wings); 13,60 (towers)
	TOTAL NET AREA [m^2]:	2568
	TOTAL VOLUME [m^3]:	10270,00
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	B2: Austrian city area with villas
	SPECIFICATIONS:	\
	NOTES:	\
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	yes; cultural heritage
	REGULATORY REFERENCE:	L. 1089/1939, art. 1, 2; D.Lgs. 42/2004, art.10
	FROM DATE/YEAR:	29/03/1956
	OTHER RESTRICTIONS:	PRG: Buildings of historical, architectural, environmental value (Group 1)
NOTES:	*OTHER INFORMATION:*	building open area is classified as "historical gardens and parks"

Figure 30: Villa Louise: Building ID Part 1

BRIEF HISTORY			Villa Louise
PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
1676	residence	noble family Studenitz	construction
1687	residence	fam. Morelli de Schönfeld	\
1775	residence	count Nicolò Francesco Attems	during the XVIII Century the villa was enlarged with two simmetrical wings and towers, composing a U-plan
1780	residence	count Raimondo IX della Torre (Thurn)-Hofer	added the entrance gate which was a city gate indeed; + see above
1807	residence	Carlo de Maffei	see above
1825	residence	Trading Company Iacob Senigaglia	the villa was completed
1854	residence	Giuseppe Persa de Liebenwald	1861: the entrance gate was moved closer to the villa
1867	residence	Tommaso smart (Schmart) and successors	names the villa after his wife Louise - Luigia
1908	residence (Coronini probably lived in it during 1919-1948)	countess Nicoletta Coronini Cronberg (and later became of his brother Guglielmo)	occupied by Austrian troop during WWI, then again by another army around 1920, when the family Coronini did some reconstruction works; meanwhile, the militaries modified some indoor spaces (added a kitchen and two dining rooms)
1950s	residence, offices	fam. Coronini Cronberg	in the 1950s the park area was reduced due to urban growth (new infrastructures); the villa was rented to some families (residences) and accommodated some public offices
1990	offices, private studios	Coronini Cronberg Foundation	the villa was rented to private professionals (architects and other designers) until 2006; users made some ordinary maintenance, but the villa was already suffering from moisture and rainwater infiltrations

CONTEXT QUALITY		
LANDSCAPE QUALITY/FRAME	*urban context*	the building is situated in the city centre, at the end of a boulevard leading to the municipal house; buildings from different periods are facing the same street: the school from the 1930s, palazzo Alvarez from the 1750s, a Methodist church (1864) and other residential buildings (late XVIII - XIX Century (via Diaz) and XX Century (via Leopardi etc.)
	natural context	the building is surrounded by its park that used to be a sort of bothanical garden, but is nowadays completely abandoned; NW and NE the area is descending towards the Valletta del Corno with its stream that is bearly visible because of the dense vegetation; the Valletta park should be an urban park, but due to scarce maintenance is not popular among Gorizian citizens
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	see above; in the park is also hidden a circular fountain that is now reduced to a little stone wall
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	mixed: residence and public (schools)
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	schools, public transport, theatre and all other facilities (commercial and public offices) are very close
ACCESSIBILITY	*main infrastructural connections, transport facilities*	urban road

SOCIAL VALUE		Villa Louise
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	The building is located in the city centre, in a very visible position, reminding people of its valuable presence. In a recent fund-raising action (2013) citizens showed a great interest in its refurbishment, demonstrating their awareness of the historic and architectural values connected to it.
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	Residential building owned by several noble families from Gorizia.
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use*	Since it was not abandoned a long time ago, people are quite attached to it, for many of them had the opportunity to enter it or to work in it - due to private designer studios it was also named "home of the architects".
SPIRITUAL VALUE	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*	\

ARCHITECTURAL QUALITY		
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	Simmetric U-form building that is embracing a front courtyard; the central volume is included between two three-storeys towers (staircases) that connect it to the 2-level side wings; the massing is harmonious and porportions give a pleasant appearance to the main facade, which is enriched by several decorative elements and a balcony with a mullioned opening.
	decorative elements (exterior and interior)	Pediment, string courses, four giant pilasters, cornices, stone opening frames, corbels supporting the balcony with its balustrade and XVIII Century frieze, indoor wall paintings from 1750 ca.
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	Venetian villas
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	\
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	\
TYPE/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	The central part (dating back to the XVII Century) resembles the well-known "Venetian cube", the ideal form of venetian villas with the main room at the first floor.
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	\

PRESERVATION DIRECTIVE	
Summurise directive and restrictions from the authority in charge for the preservation of the subject.	No specific prescriptions were found, however it can be assumed that external appearance of the villa should be mantained, as well as all distinctive features of the central volume that is the oldest and the most decorated too.

BUILDING ID (PART 2) — Villa Louise

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS (before renovation)
A SUBSTRUCTURE	*A01 Foundations*	n.d.	n.d.	n.d.
	A02 Slab on Grade			
	A03 Basement walls	n.d.	n.d.	n.d.
B SUPERSTRUCTURE (load-bearing)	*B01 Frame*			
	B02 External Walls	stone masonry	limestone - sandstone lime mortar	gaps in the mortar, presence of vegetation
		brick masonry	clay brick lime mortar	presence of vegetation, part of brick masonry has collapsed (secondary building)
	B03 Internal Walls	stone masonry	limestone - sandstone lime mortar	n.d.
		mixed masonry	clay brick limestone - sandstone lime mortar	n.d.
		mixed masonry	pebbles limestone - sandstone lime mortar	disintegration
	B04 Upper floors	concrete slab on wooden structure	concrete, steel, fir wood	n.d.
		wooden structure	larch	partially collapsed, rotten due to infiltration and moisture
		hollow clay floor slab (mixed), many floor structures were reconstructed adopting mixed solutions	clay, concrete, steel	good but not satisfying earth-quake-resistance prescriptions
		wooden structure (2nd floor)	larch	some are damaged and irrecoverable
	B05 Roof	wooden roofing structure	larch	partially collapsed due to water infiltration and moisture
	B07 External stairs	iron	iron	oxidation, instability, presence of vegetation
	B08 Internal stairs	wooden stairs	wood (n.d.)	the newer ones (E wing) are in good condition; the other two staircases in the towers are instable (moisture)
		stone stairs (representative stairs in the central object)	stone blocks	dust
	B09 Projections	stone columns supporting upper storey and creating a loggia (on the back)	limestone	biological patina

Figure 31: Villa Louise: Building ID Part 2

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS (before renovation)
C PARTITION & CLOSURE	*C01 Interior partitions*	bricks and mortar	clay brick mortar (n.d.)	\
		plastered and painted light wood structure and panels	wood mortar	dust
	C02 Internal doors	wooden doors (single or double-fleated) varnished	wood (n.d.), brass	good, recoverable
	C03 External doors	metal doors, single-fleated	iron	oxidation
		varnished wooden doors, single- or double-fleated, with or without fanlight	wood (n.d.), iron, glass	exfoliation (varnish layer), metalware oxidation, some window panes are broken (missing)
	C04 Windows	varnished wooden windows, fixed, single- or double-fleated; with or without shutters made of wood with iron metalware; some windows are provided with iron grates	wood (n.d.), iron, glass	exfoliation (varnish layer), metalware oxidation, some window panes are broken (missing) often due to vegetation presence
D FINISHES	*D01 External wall finishes*	external plaster + paint	lime mortar	presence of vegetation, biological colonisation and patina; moisture; local swelling and missing
	D02 Internal wall finishes	internal painted plaster	lime mortar	generally bad due to water infiltration and moisture, presence of vegetation, biological colonisation, frequent stains and exfoliation or detachment, diffused discoloration
		ceramic tyles	ceramic	obsolete, cracked, presence of dust
	D03 Stair finishes	see structure	\	\
	D04 Floor finishes	parquet	oak	partially recoverable, many areas suffer from water infiltration
		wood boarding	oak	not particularly valuable, unrefined surface
		linoleum	linoleum	obsolete and damaged; inappropriate material
		ceramic tyles	ceramic	obsolete, presence of dust
		cotto tiles	cotto	disgregated
		palladiana	marble	good
	D05 Ceiling finishes	painted plaster and stucco decorations (frames)	lime mortar and stucco	partially collapsed due to water infiltration; biological colonisation, moisture, discoloration
	D06 Roof finishes	roof tiles on flat tiles and wooden laths	clay, larch	biological colonisation, moisture; roof is partially collapsed
	D07 Doorstep	stone block	limestone	good, erosion due to usage

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS (before renovation)
E DECORATIVE ELEMENTS	*E01 External wall decoration*	painted pilasters	clay bricks, stones, lime mortar	decoloration, detachment (paint)
		painted stringcourse	lime mortar	discoloration
	E02 Internal wall decoration	wall paintings	tempera	moisture, cracks
	E03 External window & door framing	stone frames	limestone	presence of vegetation, stains and dust
	E04 Internal window & door framing	\	\	\
	E05 Roof decoration	pediment of bricks and mortar	clay bricks, lime mortar	discoloration
		cornice of bricks and mortar	clay bricks, lime mortar	presence of cracks and vegetation, local detachment
	E06 Balustrade and parapets	external balustrade	concrete	the original stone balustrade was substituted because it was damaged
	E07 Other	corbels	concrete	dust
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	iron gutters and drainpipes	iron	oxidation, discontinuity of elements
	F02 Plumbing	present	\	obsolete
	F03 Heating	present, boiler is in the basement	\	obsolete
	F04 Ventilation & A/C	missing	\	missing
	F05 Electrical installations	subsurface wiring	\	obsolete
	F06 Gas installation	present	\	\
	F07 Communication installation	present	\	\
	F08 Lifts & Escalators	\	\	missing
	F09 Fire protection	\	\	obsolete
		OMISSIS		
	F10 Protective installation	\	\	\
G SITE EQUIPMENT	*G01 Site enclosure*	main entrance gate made of iron; perimetral walls of stones and cement mortar	iron stones, cement mortar	iron oxidation; presence of vegetation
	G02 Site paving (hard landscaping)	\	\	\
	G03 Soft landscaping	gravel (court) uncontrolled vegetation	various	scarce maintenance
	G04 Site services (public utilities)	all main installations	\	\
	G05 Site buildings	secondary buildings are next to the NE wing	\	abandoned
	G06 Site fittings	ruins of a historic circular fountain in the backyard (park);	stone	overgrown with vegetation
		well in the centre of the front court	stone blocks, mortar, iron	mortar gaps, cracks, vegetation, general instability, oxidation

Vocationality Analysis

Table 25: Villa Louise: Vocationality Analysis

PARAMETER GROUP	RES	PRO	ACC	C&A	PUB	min
CONTEXT QUALITY (territory)	0,663	0,433	0,597	0,623	0,624	0,433
ECONOMIC CONTEXT (area)	0,623	0,672	0,727	0,992	0,784	0,674
B&S QUALITY	0,743	0,539	0,723	0,555	0,711	0,547
B&S VERSATILITY	0,695	0,514	0,684	0,577	0,688	0,525
POTENTIALITY	0,495	0,338	0,457	0,595	0,524	0,397
COMPATIBILITY	0,612	0,390	0,586	0,416	0,582	0,425
VOCATIONALITY	0,665	0,535	0,663	0,705	0,685	0,580

Similar results, which can be grouped together, are underlined, whereas red scores should be excluded due to particularly low scoring.

The context quality analysis puts residential use as first, since the subject is situated in the city centre, close to all facilities and public transport as well as green areas for leisure activities. All these features were evaluated as very important for residential use and slightly less for public and c&a activities that are second. On the contrary, the location is not suitable to accommodate production areas.

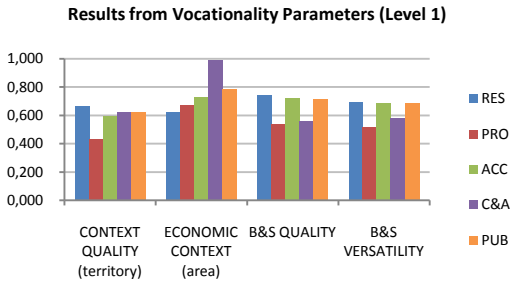


Figure 32: Villa Louise: Chart with Vocationality Results 1

Residential use is excluded in the economic context analysis, for the building is in a strategic, visible position, which was not seen as a positive value for such "private" purpose. Anyway it justifies the high rating of c&a, that was also favoured by the presence of schools and offices nearby, which defined the area as prevalently administrative. Despite this, there are also some houses that could classify the zone as residential, reconsidering such use.

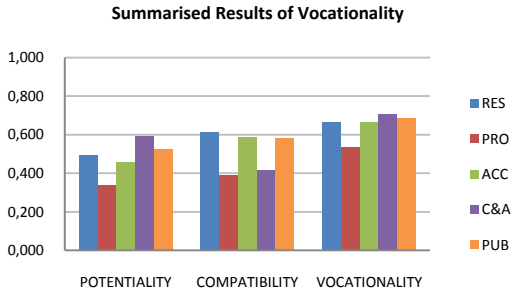


Figure 33: Villa Louise: Chart with Vocationality Results 2

Building and site quality and versatility provide the same order of preference, which is obviously respected in their grouping (compatibility) too. In this case, residential use comes again first, due to the building special features and availability of a pleasant and versatile open area.

Potentiality confirms the final vocationality results, where the preference goes to c&a (offices and retail), secondly to public activities (cultural, sport, health, etc.) and residential and accommodation as third; production should be avoided[111].

The project proposal is in line with such indications, since the villa should accommodate start-up offices with some common areas for public exhibitions or events and a few rooms for guests, while the secondary building has a laboratory and the housekeeper's apartment.

[111] For further information on vocationality analysis see the attached evaluation model of villa Louise (A_VII.1).

Sustainability Analysis

Table 26: Villa Louise: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,670**	**41**	**1**	**33**	**73**	**45,21%**
SOCIO-CULTURAL S.	0,853	22	0	12	34	35,29%
ENVIRONMENTAL S.	0,400	17	0	11	27	40,74%
ECONOMIC S.	0,713	2	1	3	4	75,00%

The preliminary project for the re-use of Villa Louise obtains a discrete sustainability performance (general sustainability: 0,670/1,000), with a particular good scoring in the socio-cultural sustainability (0,835), a slightly inferior total in the economic area (0,713), while the environmental domain is not sufficient (0,400), for it is below the 0,500 threshold. Thus, the project is not yet sustainable: some improvements are needed or more answers need to be provided.

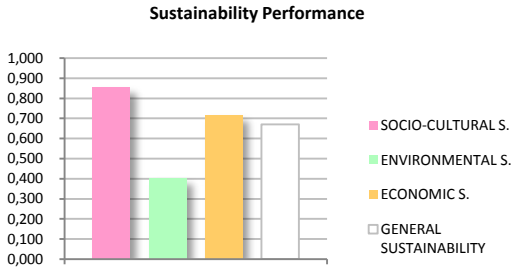


Figure 34: Villa Louise: Chart with Sustainability Results

The completion % of the assessment suggests that many solutions are still undefined, since only 41/73 answers were completed [112]. Only the profitability criterion was excluded from the evaluation table, because the whole operation is promoted by public authority, with no aims at generating revenues. However, the most reliable score is the economic performance, where 2/3 parameters obtained good evaluations, while the operating cost management is not yet definable.

The high performance in socio-cultural sustainability is supported by a 35% accomplishment: the project is currently able to guarantee only low invasive solutions and public usability and benefit, but nothing has been decided yet on maintenance & management, reversibility, compatibility and recognisability, nor on the users' comfort.

Environmental sustainability is the most critical, with low/uncertain performances in energy consumption reduction and no evaluation for ecological impact. By contrast, the project cares about environmental quality with optimal results in impact on neighbourhood, transport facilities and improvement of external areas (partially completed).

[112] For further information on sustainability analysis see the attached evaluation model of villa Louise (A_VII.1).

4.2.2 Vila Laščak, Rafut, Nova Gorica

Introductory information

The villa is a unique example in the territory of Gorizia-Nova Gorica of neomamluk/neo-Islamic style, mixed with the tradition of western Europe and technological innovation. The building was designed at the beginning of XX Century by arch. Antonio Lasciac Bey as his private residence on Rafut, a hill between Nova Gorica and Rožna dolina. Situated in a green environment, the villa has also its own beautiful park, totally invisible from the street, but easy to identify thanks to the entrance building. The building was rebuilt twice (after both world wars) and was largely modified to accommodate healthcare services. Abandoned since 2004, the building roof was repaired in 2012 and the following year a detailed conservation programme was prepared on the basis of construction elements analyses.

However, already in 2007 a re-use project was developed up to the intermediate phase (project for building permit acquisition) – which will be presented in chapter 4.3.2. Due to insufficient financial resources and to the new, more restrictive, earthquake-resistance regulations, the project was later abandoned. In 2014 a second proposal, currently at a preliminary stage, was submitted; this recent project was also selected as a case study and will be illustrated in the next paragraphs.

Project presentation

The model was tested on the preliminary project outlined in May 2014 by the Arhistudio d.o.o. from Nova Gorica. The project deals with the historical rearrangement of the park and the building conservative refurbishment, not providing a well-defined new purpose[113], but focusing on the construction preservation. Therefore, all decisions that might be affected by future uses are here considered only in general or are totally omitted.

In reference to the park, the project aims at re-establishing its historic/original asset by planting some new trees in accordance to Lasciac's idea. In order to guarantee the accessibility to emergency vehicles (firemen, ambulance, etc.) a new entrance will be opened that will lead to the parking and along the original serpentine-road up to the villa. The street will be entirely reconstructed containing all public utilities, while the walkway and stairs will be revised and replaced only if necessary. All the architectural elements that are currently in the park should be located back in their original position or must be exposed in the green area. Moreover, the park will be provided with benches and bins as well as with automatic energy-saving lighting system. Only the plateau next to the villa will be paved with concrete aggregates, whereas the parking will be permeable.

With regards to the villa, the project operates in accordance with the conservation programme (2013) that aims at preserving all recoverable finishing and at re-establishing the original appearance of the building by removing later additions and reconstructing/integrating missing elements on the basis of available archival/historical documentation. For instance, the past terrace on the southern corner will be reconstructed as well as all the black decoration on the facades.

The building structure will be revised and reinforced according to the directives of the heritage institute (ZVKDS). Interior false ceilings will be replaced with new ones (dry construction) and the windows will be restored, if possible, and insulated (glazing substitution). Wall finishing and floors should be maintained (depending on their conservation status[114]) and degradation causes removed/solved. All technical systems will be replaced with newer solutions (e.g. energy-saving lighting, intercom, video security system, fire detection, HVAC, radiators and convector heaters with zone thermostat) in order to guarantee a good indoor comfort and the compliance with current regulations. Such installations will be distributed in existing wall or floor cavities (shafts), above false ceilings or under the plaster layer – always invisible to the users – whereas a technical

[113] However, the project mentions the idea of the Municipality of Nova Gorica of establishing a Centre for Eastern cultures with: a meeting place, a migration documentation centre with integration purposes as well, video and digital archive of Lasciac's works, culinary centre and some studios.

[114] In case of substitution the materials will be defined in reference to the new building use/room purpose.

room will be placed in the underground level. In addition to this, the project also introduces a lift and adopts some other solutions for indoor acoustic comfort (acoustic insulation of floors and technical systems).

In general, the preliminary project has not yet defined many solutions, materials nor techniques. Despite this, some answers were derived from another study concerning the earthquake-resistance performance of the building (ZAG, 2008). At the end of the analysis the authors suggest to strengthen the villa's structures by replacing all floor slabs with new ones (reinforced concrete) and by means of construction binding and reinforced concrete plaster application on interior load-bearing walls.

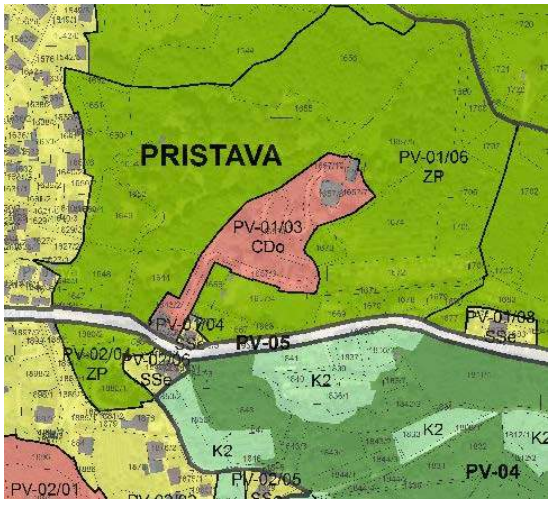
Knowing Phase

Iconographic material

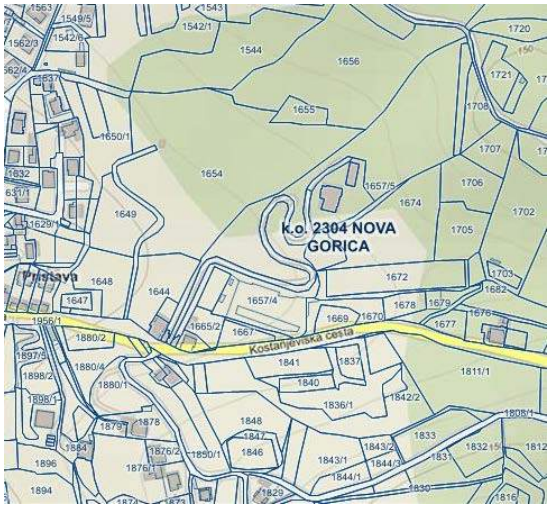
LOCATION: AERIAL VIEWS, TOWN ZONING PLAN, CADASTRAL MAP

Aerial View of Vila Laščak (Google Earth)

Aerial View of Vila Laščak (Bing Maps)

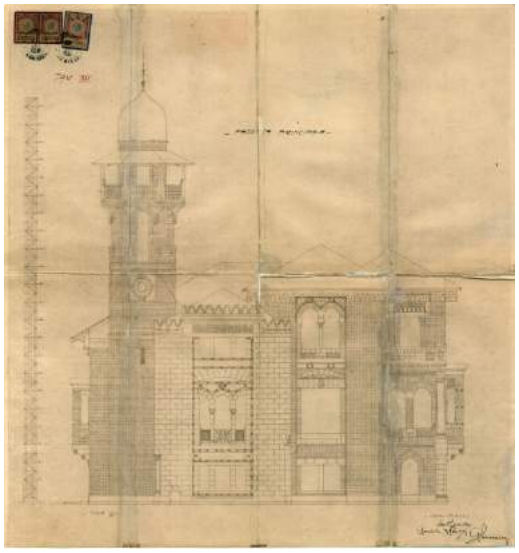


Town Zoning Plan Extract
(PISO: https://www.geoprostor.net/piso)



Cadastral Map Extract
(PISO: https://www.geoprostor.net/piso)

PAST SITUATION: ARCHIVAL MATERIAL (PROJECTS, PHOTOS, DRAWINGS, ETC.)

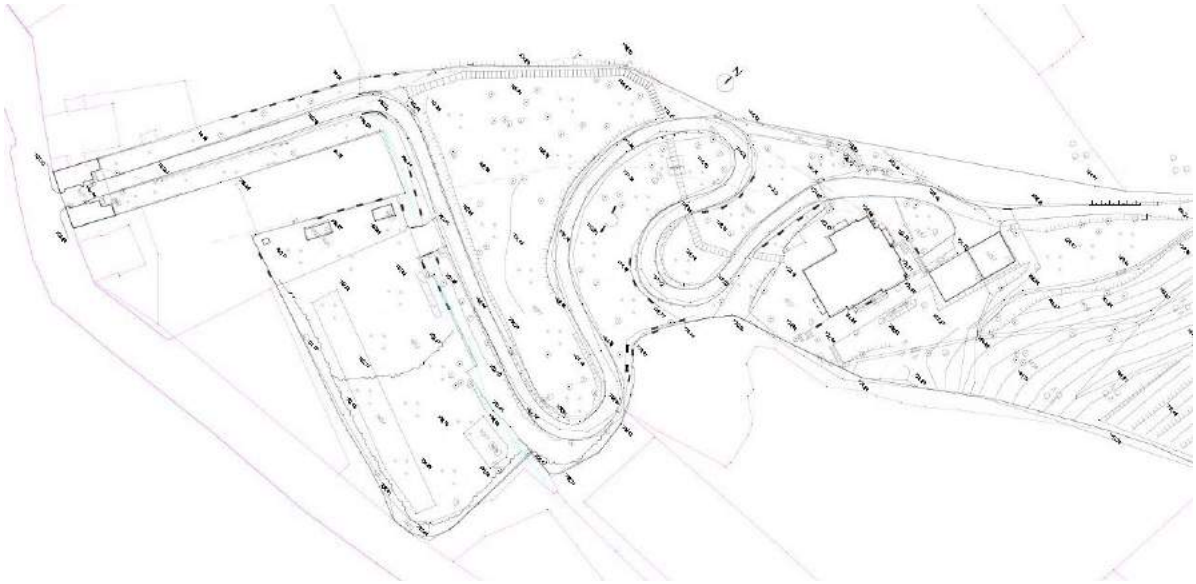


Vila Laščak 1908-1914 (Barillari et al., 2014)

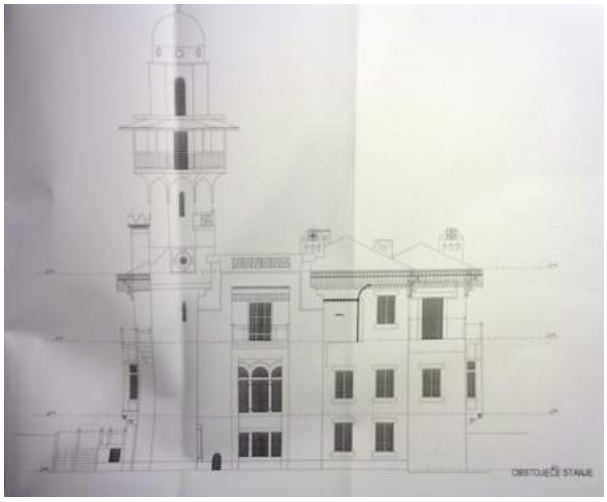
On the Left:

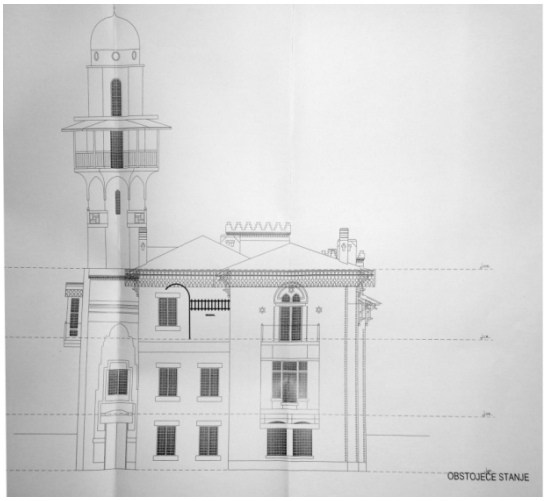
Lasciac's Project (1909): Main Facade (ASG-ASCG 1°v. b.901, n.9888/1909)

CURRENT SITUATION: DRAWINGS, EXECUTED PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)



Left: Situation Plan (Arhistudio, 2014)
Below: Southern and Eastern Facades (Domino arhitekti, Štrancar, 2007)





EXTERIOR PICTURES



View of the Entrance Building, the Tower-minaret, External Wall Detail (Lombardi, December 2012)

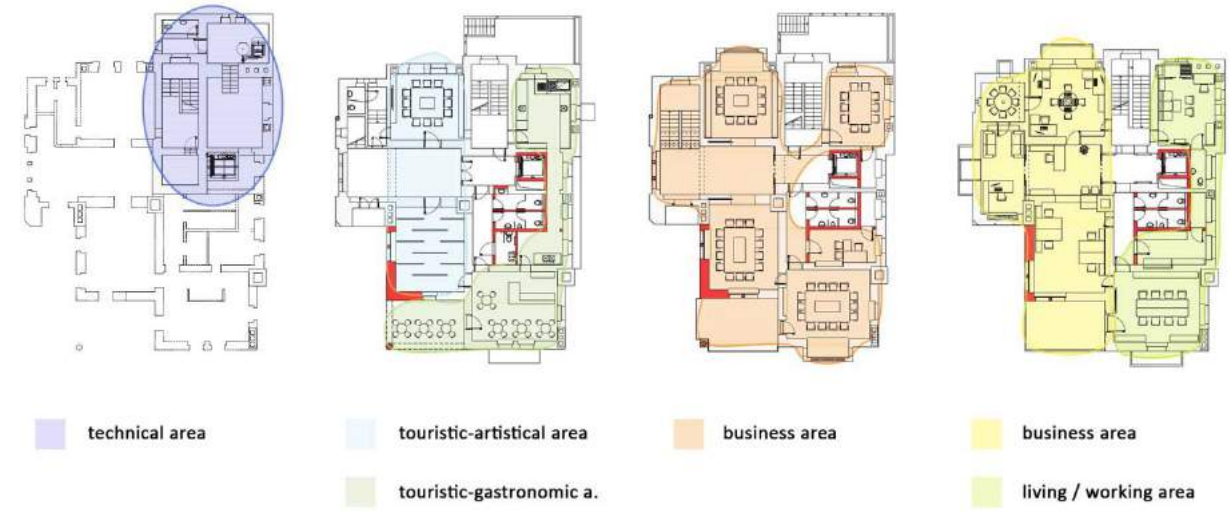
INTERIOR PICTURES



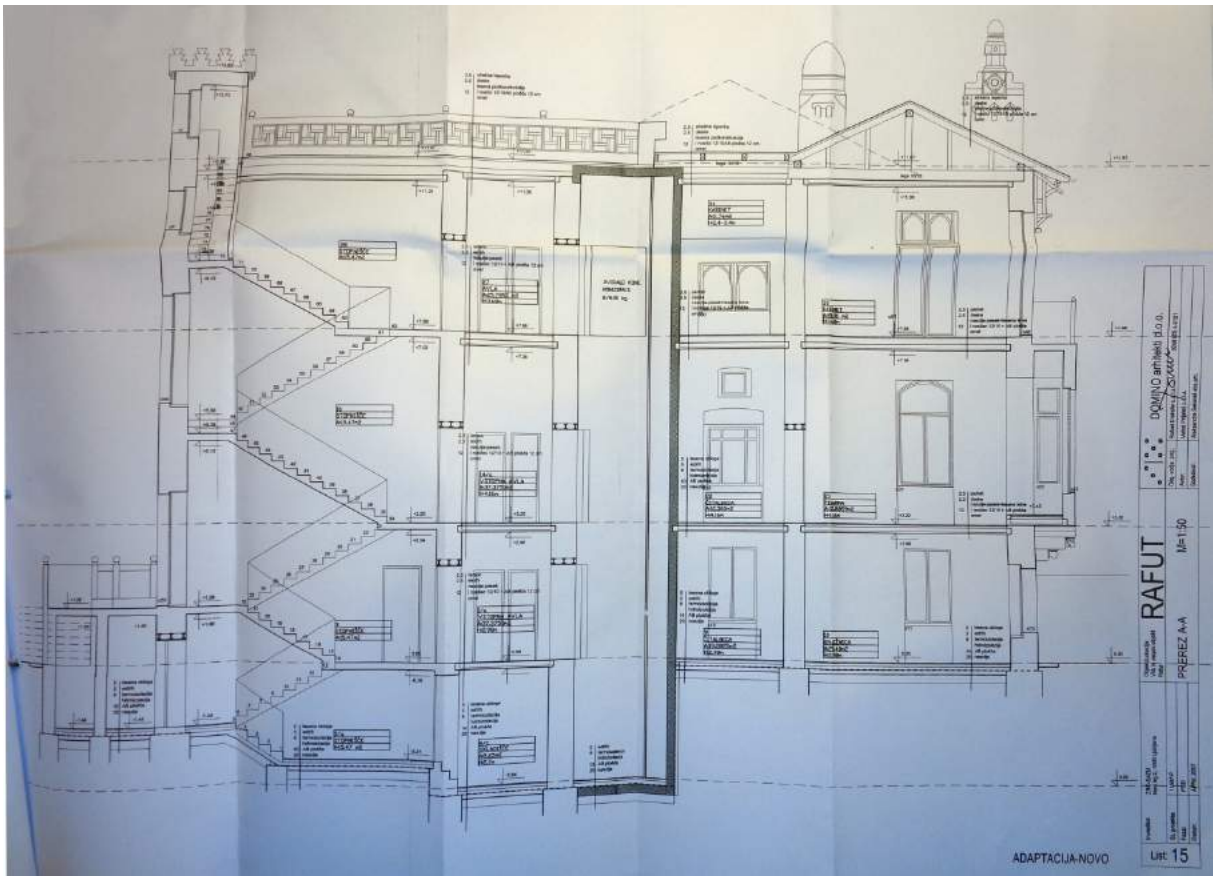
Inside the Tower; the Secondary Staircase; First Floor (Lombardi, September 2012)

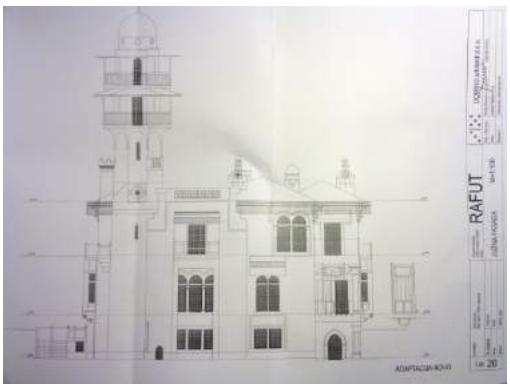
FUTURE PROJECTS: DRAWINGS, SKETCHES, PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)

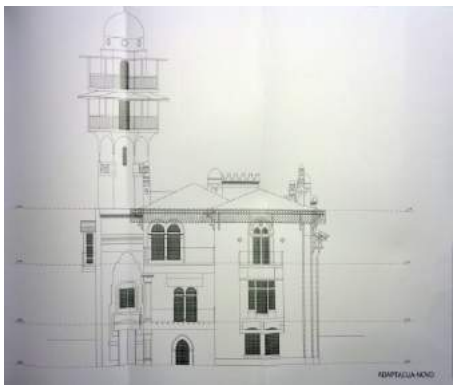
Master Plan - Park and Vila Laščak (Arhistudio, 2014)



Vila Laščak (Preliminary Project): Functional Layout (Arhistudio, 2014)







Intermediate Project (PGD): Cross-section, Southern and Eastern Facades (Domino & Štrancar, 2007)

BUILDING ID (PART 1) — Vila Laščak

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	Rafutski park z vilo; Vila na Rafutu, Vila Laščak; Villa Lasciac
	CURRENT PROPERTY:	RS - MIZŠ
	MANAGER AUTHORITY/SITE MANAGER:	RS - MIZŠ
	TYPE:	villa with minaret and entrance building in an exotic park with asimmetric and organic pathway
	STYLE:	neo-Islamic wih Mamluk and Moorish decorative elements
	YEAR/PERIOD OF CONSTRUCTION:	1909-1914
	AUTHOR/DESIGNER:	Antonio Lasciac / Anton Laščak
	ORIGINAL USE/FUNTION:	residential
	ACTUAL USE/FUNCTION:	abandoned
	CONSERVATION STATUS:	mediocre
LOCATION	*NATION:*	Slovenia
	MUNICIPALITY:	Nova Gorica
	CITY/TOWN/LOCALITY:	Nova Gorica - Pristava
	ZIP CODE:	5000
	ADDRESS & CIVIC No°:	Kostanjeviška cesta 16
	COORDINATES:	y=394855,5; x=90201,7
	ALTITUDE MSL [m]	124,4
	CLIMATIC ZONE [DD]:	2333
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	2304 - Nova Gorica
	CADASTRAL MAP/SUBJECT No°:	\
	PARCEL/CAD. UNIT:	1657, 1662, 1663, 1664, 1658
NUMERICAL DATA - site	*LOT AREA [m^2]:*	19000
	COVERED AREA [m^2]:	682,1
	UNCOVERED AREA [m^2]:	11895,25
	BUILT AREA [m^2]:	595,28
NUMERICAL DATA - building	*No° OF STOREYS ABOVE GROUND:*	3 + terrace and 3-level tower
	No° OF STOREYS UNDERGROUND:	1
	TOTAL STOREY No°:	*4 + roof terrace*
	PLANT AREA [m^2]:	550
	AVERAGE HEIGHT [m]	11,87 building; 26,83 tower
	TOTAL NET AREA [m^2]:	745,11
	TOTAL VOLUME [m^3]:	*8850 ca.*
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	Cdo
	SPECIFICATIONS:	CD = Other areas of central activities
	NOTES:	o = commercial, service, business and gastronomic (food) or artisan activities
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	Cultural heritage - local interest: EŠD 7917
	REGULATORY REFERENCE:	OKO n. 21/2003-100; Ur.l. RS, n. 52/2004-2505 (Registration Act of Park and Villa Rafut);
	FROM DATE/YEAR:	2004
	OTHER RESTRICTIONS:	\
NOTES:	*OTHER INFORMATION:*	\

Figure 35: Vila Laščak: Building ID Part 1

BRIEF HISTORY

PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
1908-1910	\	Anton Laščak (buys property in 1907)	project of the entrance building (1908); villa project (17/5/1909); vegetation project (1909);
1909-1914	residential	Anton Laščak	1909-1914 construction period: during construction works the project was modified: basement level was added, staircase was moved from E to N, facades and minaret's openings were modified, the tower was raised (+1 level) and another balcony was added; several construction managers: Girolamo Luzzato (project co-signer), followed by Angelo Costantini, Ernesto Rossi, Alessandro Pich, Eugenio Marega; 1912 entrance building is complete; 1914 villa is finished and obtains use permit;
WWI: 1916	residential, not in use	Anton Laščak	partial demolition due to bombing: roof, northern facade, central part with staircase and external balcony; 2nd bombing: demolished part of the tower and
1928-1929	residential, not in use	Anton Laščak	reconstruction with cheaper materials (due to scarse war refunding) and fewer decorations: concrete instead of stone at side-staircase, no black decorations on brickwork, no wooden roof overhang on the east part, concrete balustrade instead of wooden; construction of garage
1939	\	National Insurance Institute	donation for lifelong rental
WWII	\	National Insurance Institute	bombing: SW terraces are destroyed while the western facade and eastern balustrade on the terrace are partially demolished
post 1945	administration, office, laboratories: Zavod za socialno medicino in higieno (Institute for social medicine and hygiene)	SFRJ	confiscated by SFR Jugoslavija: the villa is assigned to the Zavod za socialno medicino in higieno: incoherent reconstruction of terraces (open balconies were closed) and many interior modifications: 1976: modification of technical equipment (electricity, water, sewage system etc.); 1979: installation of central heating (solid fuel); 1983: project of sewage system; 1985/86: garage enlargement; 1986: central heating renovation;
up to 2004	administration, office, laboratories: Zavod za zdravstveno varstvo NG (Healthcare Institute of Nova Gorica)	RS - MIZŠ (2008)	dismissed in 2004
2012	\	RS - MIZŠ	inappropriate renovation of the flat roof: rainwater disposal system was not properly restored and it caused severe water infiltration down the lateral staircase into the underground level

CONTEXT QUALITY		
LANDSCAPE QUALITY/FRAME	*urban context*	\
	natural context	the villa is situated on a green hill with few constructions (generally private houses) facing Gorizia's castle and university hill (to the W and SW); on the other side (N), there is Kostanjevica with its historic sanctuary, whereas on the East part the green environment continues with the great Panovec wood
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	the park is very rich in biodiversity, with rare species as well; all varieties have not been recognised yet
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	the area is a natural and private residential area between Nova Gorica's centre and Rožna dolina
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	on the hill there are no services, but some can be found within 5' walk (supermarket, gas station, restaurants and cafe, university NG)
ACCESSIBILITY	*main infrastructural connections, transport facilities*	a single road is crossing the hill and it connects Nova Gorica with Rožna dolina; the villa is then provided with a private road that leads from the entrance building to the residence

SOCIAL VALUE		
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	\
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	The building was designed and owned by one of the most famous architects of Gorizia.
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use*	\
SPIRITUAL VALUE	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*	\

ARCHITECTURAL QUALITY		Vila Laščak
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	All the buildings within the property are coherently designed and represent a mix of western European and Islamic tradition as well as technological innovation. Particularly valuable is the integration between buildings and the natural environment that are linked together through some architectural elements that are disseminated in the park.
	decorative elements (exterior and interior)	minaret/tower, wooden and concrete cladding or details shaped in Islamic ornamental motives, black-coloured bricks that reproduce Islamic decorations
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	The villa is a unique example of neo-Mamluk, neo-Islamic style in Gorizia-Nova Gorica, as interpreted by a European architect.
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	The designer A. Lasciac is one of the most influential European architects, who worked in Egypt at the end of the 19th Century; he shaped the new Egyptian national culture by mixing western European elements with Islamic tradition and was honoured with the title of Khedive's architect. His works are today of great importance.
TYPE/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	Lasciac tried to hold together practicity and beauty, which is still admirable in the wooden furniture of the villa, particularly fascinating due to modern design and technological completeness.
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	Adopted material (concrete) and building techniques were innovative in the early 20th Century: concrete constructions and prefabricated concrete elements with islamic decorative elements, ceramic tyles by Appiani-Treviso were produced in a new way and guarantee high-quality standards

PRESERVATION DIRECTIVE	
Summarise directive and restrictions from the authority in charge for the preservation of the subject.	In 2013 a specific preservation programme was developed by a team of experts for the whole property (buildings and park) containing general directives, report on laboratory surveys, a scrupulous catalogue of characteristic elements, material composition, conservation status and specific treatment indications. (Authors: Nastja Nylaander, Zoran Trop, Benjamin Korošec, Boštjan Vauda) Prescriptions for the preservation of the villa: no enlargement is permitted, all facades must be preserved with the exception of incongruous reconstruction after WWII; decorative apparatus must be preserved, black decorations on bricks should be restored according to verified documentation, any integration should be well-documented; restoration of the original open terrace should be carried out in accordance with expert team; parts reconstructed in 1928-29 should remain clearly legible; roof configuration should not be modified (later raised parts must be demolished), rainwater disposal system is restored with copper or zinc-titanium elements; missing wooden roof decoration on eaves must be reconstructed (E, N facades); missing decorative elements that can be found in the park are placed back in the original position; chimneys and cavities are restored according to the original plan; wooden elements are restored and painted again in ochre (original colour); walled-up openings are re-established; disturbing elements are removed from facades (wiring etc.); shutters are replaced with new, wooden shutters; access to the tower is granted again; interior floor finishing can be replaced if badly damaged (except for terrazzo areas, Treviso's tiles and recoverable parquet); doors and windows are restored or replaced if not reusable; paint colours must be defined with competent preservation authority; later internal partition must be removed, structures completely preserved; furniture must be restored and conservated; door and window handels are reconstructed looking at original pieces etc.

BUILDING ID (PART 2)

Vila Laščak

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	GROUP ELEMENTS	QUANTITY / PRESENCE		DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
A SUBSTRUCTURE	A01 Foundations	\	ml	concrete (not reinforced), 20 cm larger than walls and 85 cm below ground level	concrete	\
	A02 Ground floor	\	mq	concrete slab	concrete	\
	A03 Basement walls	\	mq	concrete (underground walls and partially underground on the E, N)	concrete	water infiltration and high moisture level
B SUPERSTRUCTURE (load-bearing)	B01 Frame		ml			
	B02 External Walls	\	mq	concrete base and unplastered brickwork (brick dim. 12,3-13,0/25,2-26,2/5,9-6,4 cm) with lime mortar; thickness: 26-106 cm	concrete clay brick lime mortar	severly damaged due to water infiltration and moisture; vertical cracks are visible in the tower envelope; growing vegetation; concrete bricks are dislocated due to mechanical actions, visible damages due to firearm
	B03 Internal Walls	\	mq	brickworks	clay bricks mortar	walls of the lateral staircase are severly damaged due to water infiltration from the flat roof
	B04 Upper floors	\	mq	reinforced concrete (steel I beams) and wooden structure for post WWII reconstructed parts tower: reinforced concrete slabs	concrete, steel wood	\
	B05 Roof	\	mq	reinforced concrete slab (flat roof); tower: monolithic concrete dome; wooden roof structure (pitched roof) coloured with ochre	concrete, steel pine	wooden structure condition is sufficiently good
	B06 External stairs	.....	mq			
	B07 Internal stairs	\	mq	representative stairs are made of stone blocks; lateral staircase: stone blocks and concrete elements (reconstruction)	stone (n.d.)	lateral staircase is affected by water infiltration
	B08 Projections	\	mq	wooden balcony on the 2nd floor W; concrete balcony on the upper terrace;	larch concrete	some parts of the concrete balcony are missing
C PARTITION & CLOSURE	C01 Interior partitions	\	mq	brickworks	clay bricks mortar	\
	C02 Internal doors	\	n°	11 different types (including external) of wooden doors with glass and brass handles	pine, glass, brass	some doors are missing, otherwise are in good conditions, except for handles that are missing (vandalism)
	C03 External doors	\	n°	wooden entrance door and garage door	beechwood	\
	C04 Windows	\	n°	31 types of wooden windows (incl. French doors) with shutters (originally wooden) and brass handles; 6 windows are protected with iron frames with glass; some are double windows; windows are externally finished with brown oil colour (originally light ochre); ochre colour or ivory is used on interior side	beechwood plastic brass iron, glass	wooden shutters (beech+oak) were replaced with plastic shutters (some original pieces were found in the tower); 4 original window handles are available; wooden windows are in good condition for restoration (no replacement)

Figure 36: Vila Laščak: Building ID Part 2

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	QUANTITY / PRESENCE		DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
D FINISHES	*D01 External wall finishes*	\	mq	unplastered with concrete cladding (base and western wall)	concrete	facades have some visible stains caused by meteorological events, pollution, water infiltrations; missing materials in the E part (inappropriate use of material during reconstruction)
	D02 Internal wall finishes	\	mq	plaster	lime mortar	many stains came out due to moisture, plaster layer is coming off, paint is peeling off
	D03 Stair finishes	\	mq	stone (each stair is a shaped stone block in the representative staircase) and marble sheet as parapet	stone (n.d.) marble (various types)	\
	D04 Floor finishes	\	mq	concrete (underground rooms); groundfloor: hexagonal ceramic tiles; planking with wooden boards and beechwood parquet finishing (5 different types: 2 fishbones, 2 parallel and 1 cube) with pine skirting boards or linoleum	concrete ceramic beechwood, pine	ceramic tiles are preserved only in part; some parquet surfaces are swollen and raised due to moisture/water excess
	D05 Ceiling finishes	\	mq	wooden boarding with plaster applied to wooden lath; or wooden ceiling (southern rooms on grounfloor and SW rooms on first floor)	wood sticks lime mortar	stains, missing parts due to moisture and no maintenance
	D06 Roof finishes	\	mq	roof tyles (pitched roof) and waterproof membrane (flat roof)	clay waterproof membrane (not specified)	flat roof membrane was replaced in 2012
	D07 Doorstep	.....	mq			
E DECORATIVE ELEMENTS	*E01 External wall decoration*	\	mq	some decorative elements of concrete, reinforced concrete or wood; some clay bricks have a particular shape or are coloured with black	concrete concrete + steel wood clay	missing black-brick decoration was not restored during Lasciac's post WWI reconstruction;
	E02 Internal wall decoration	.....	mq			
	E03 External window and door framing	\	ml	prefabricated concrete elements with neo-Islamic decorations	concrete	some have horizontal cracks
	E04 Internal window and door framing	\	ml	wooden frame	pine	\
	E05 Roof decoration	\	ml	wooden cutout frame on wooden decorative corbels, supported by concrete corbels	larch concrete	partially present; it used to decorate all pitched roofs
		\	n°	brick chimneys with prefabricated concrete tops	concrete, clay brick	some tops are missing (some are in the garden close to the villa)
	E06 Balustrade and parapets	\	ml	wooden parapets for wooden balcony; marble parapets for representative stairs and black varnished iron parapet with wooden handrail in the lateral staircase; prefabricated concrete parapet on the flat roof/terrace	larch; marble and stone (various); iron, wood (n.d.) concrete	instable or damaged external parapets

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	QUANTITY / PRESENCE		DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	Y	Y/N	\	\	inappropriate and not functioning
	F02 Plumbing	Y	Y/N	\	\	inappropriate
	F03 Heating	Y	Y/N	central heating (solid fuel), radiators	\	\
	F04 Ventilation & A/C	N	Y/N	\	\	\
	F05 Electrical installations	Y	Y/N	visible wiring	\	inappropriate
	F06 Gas installation	Y	Y/N	gas tank is in the park	\	inappropriate
	F07 Communication installation	Y	Y/N	visible wiring	\	inappropriate
	F08 Lifts & Escalators	N	Y/N	\	\	\
	F09 Fire protection	N	Y/N	\	\	\
	F10 Protective installation	Y	Y/N	visible on facade	\	inappropiate
G SITE EQUIPMENT	*G01 Site enclosure*	Y	ml	brickworks; metal wired grid	clay bricks; metal (n.d.)	\
	G02 Site paving (hard landscaping)	Y	mq	concrete stairs (walkway)	concrete	\
	G03 Soft landscaping	Y	mq	macadam (road), gravel, grass	\	\
	G04 Site services (public utilities)	\	Y/N	\	\	\
	G05 Site buildings	Y	Y/N	entrance building, garage	\	\
	G06 Site fittings	Y	Y/N	concrete benches, doghouse, drinking trough, bridge, dome mould, capitel and other building elements	\	some elements are misplaced

Vocationality Analysis

Table 27: Vila Laščak: Vocationality Analysis

PARAMETER GROUP	RES	PRO	ACC	C&A	PUB	min
CONTEXT QUALITY (territory)	0,651	0,465	0,612	0,496	0,521	0,494
ECONOMIC CONTEXT (area)	0,790	0,084	0,403	0,356	0,453	0,281
B&S QUALITY	0,743	0,539	0,723	0,555	0,711	0,547
B&S VERSATILITY	0,308	0,157	0,350	0,251	0,315	0,204
POTENTIALITY	0,541	0,220	0,371	0,372	0,366	0,332
COMPATIBILITY	0,383	0,194	0,390	0,244	0,358	0,219
VOCATIONALITY	0,608	0,282	0,531	0,412	0,497	0,347

Similar results, which can be grouped together, are underlined, whereas red scores should be excluded due to particularly low scoring.

Referring to the context quality and the economic zone, vila Laščak has a propensity for residential use, since it is located in a green residential area at the town edge with some facilities nearby and close to major infrastructures and a bicycle trail[115]. Such conditions are suitable also for accommodation purposes, that would obtain similar results as residence (though never ranking first) if there were wine & food trails too. The same preference order can be found in the b&s quality, where public – despite the size and the appeal of the building – is again third due to the limited load of structures. On the other hand, versatility suggests that accommodation is preferable, followed by public and residential purpose, and c&a always last.

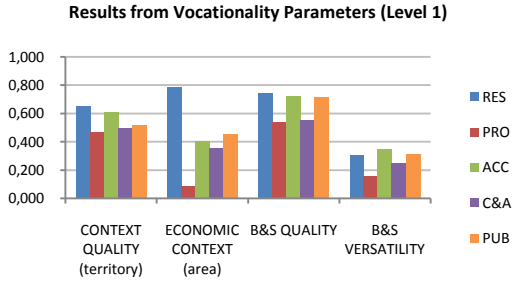


Figure 37: Vila Laščak: Chart with Vocationality Results 1

All groups agree on excluding the production option, although potentiality and compatibility provide two different orderings: characteristics of the building and its site prefer accommodation and residential, then public and c&a, while the context situation suggests residence as first, followed by c&a and accommodation and finally public. At last, the vocationality summary confirms again a preference for living purposes – residential, then accommodation – with public next.

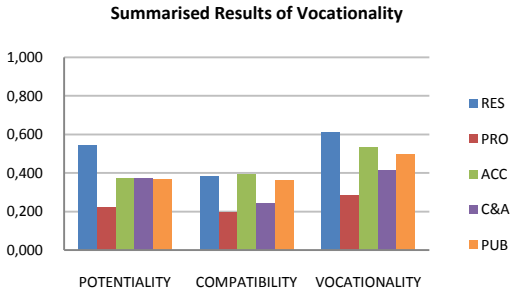


Figure 38: Vila Laščak: Chart with Vocationality Results 2

Both purposes, the preliminary solution[116] (2014) and the intermediate project (2007), are mostly in contrast with the upper conclusions, since both dedicated most of the building to business area (offices) with some public spaces and a small living area. The decision was probably influenced by the investor (potentially public).

[115] For further information on vocationality analysis see the attached evaluation model of vila Laščak (A_VII.2).
[116] The project does not define a purpose, but its functional layout is in accordance with the Municipality proposal of a Centre for eastern cultures.

Sustainability Analysis

Table 28: Vila Laščak – Preliminary Project: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,545**	**26**	**3**	**48**	**71**	**67,61%**
SOCIO-CULTURAL S.	0,746	10	0	24	34	70,59%
ENVIRONMENTAL S.	0,648	13	2	15	25	60,00%
ECONOMIC S.	0,251	3	1	2	4	50,00%

The general sustainability level of the preliminary project for vila Laščak (2014) is above threshold, yet not sustainable due to the scarce result in the economic area, where only half of the answers were provided. On the other hand, environmental sustainability is satisfactory with though only 60% of completion, whereas the socio-cultural domain is again the most performing with 0,746/1,000 and 70% of accomplishment[117].

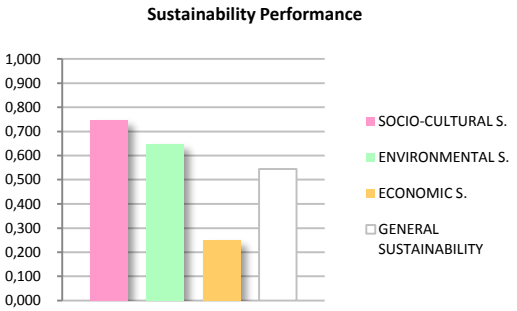


Figure 39: Vila Laščak – Preliminary Project: Chart with Sustainability Results

In this case, the high socio-cultural result is justified by the great attention to the user comfort & perception. The project is rather good also in process quality (mainly public use & benefit) and cultural heritage in general, although here the weakness is represented by structures. In fact, in order to preserve the historic character of the building, the construction can only improve earthquake resistance not reaching regulatory standards; moreover, in order to do this, invasive and non-reversible solutions were proposed with scarce material compatibility[118].

Environmental sustainability is mostly assured by the improvement of external areas and some technical solutions aimed at pollution reduction. However, many criteria are left out, since the project does not provide information on the construction site management nor building materials specifications.

Finally, the economic performance is low because of the high riskiness of the whole operation (based on many uncertainties) and due to the lack of data on financeability and coverage of operating cost, which automatically assigned the minimum input to both parameters.

[117] For further information on sustainability analysis see the attached evaluation model of vila Laščak (A_VII.2).

[118] The antiseismic analysis by ZAG (2008) considers the hypothesis of strengthening all interior walls with reinforced mortar in addition to the new reinforced concrete elevator shaft. This solution was considered in the sustainability evaluation, although the report eventually advises to replace all interior structures with new elements made of reinforced concrete, in order to guarantee better earthquake-resistance performance.

4.3 APPLICATION AT THE INTERMEDIATE PLANNING STAGE

4.3.1 Gradisca Castle: Palazzo del Capitano – Gradisca d'Isonzo

Introductory information

The Castle of Gradisca is a defensive complex in the urban centre of Gradisca d'Isonzo, a historic fortress-city 10 km southwest of Gorizia. The complex dates back to the XVI Century and has undergone various modifications since then, but always preserving its military function: mostly military barracks and a prison.

The method was tested on Palazzo del Capitano (Captain's Palace), the main building within the area, which is located in a central position and is among the oldest constructions of the complex. The palace was restored from 1978 until 1984, when the operations were interrupted due to financial straits leaving the building unfinished. Currently it is rather well preserved from the outside (although some of the new windows are already broken), while the inside reveals the new structural elements of reinforced concrete and hollow bricks[119]. Chases for technical installations were prepared but were never completed.

Project description

Two reference projects were selected for this case study: a final project from 2014 by the Studio Tecnico Bonanno Vanello and a Master's degree thesis from 2009-2010 by arch. Alessandra Monorchio.

The first one is certainly more detailed, but it considers only outdoor spaces, not including the building re-use because of a low budget. The project aims at reclaiming the historic walkways on the top of perimetral walls, it rearranges the whole open-area for public use (deforestation and cleaning) and it adopts security measures to prevent collapse of other buildings. In addition to this, the first batch will intervene on the ancient arsenal by rebuilding the wooden roof structure, re-using original roof tiles and integrating external plaster with a similar mortar composition (sample analysis). The roof and floor structures of other two buildings will be rebuilt too, possibly re-using existing materials. The second part of the plan will recover another segment of the walkways, will install external lighting and furniture and will intervene on the church, the prisons and on the building "La Longa".

In general, all the interventions will be defined in relation to specific analyses of samples, in order to maximise the material compatibility. The building floor structures will be strengthened with reinforced concrete screed and tie rods, while the roof will be anchored to a new ring beam and the brick walls will be injected with lime mortar. An interesting part of the project documentation is also the detailed maintenance plan for all the building elements.

On the other hand, the second project, by Monorchio, defines a new functional programme for the whole area, some urban interventions to reconnect the complex to nearby infrastructures and a specific re-use project for the Palazzo del Capitano, though not providing all the information requested in the sustainability model. Monorchio suggest to turn the area into a museum centre with research activities, where various authorities will manage the independent functions: the ancient arsenal should be used for exhibitions, the "Caserma Austriaca" would accommodate didactical and artisan workshop with a small boutique, the "Corpo di Guardia" would host a café and a restaurant with open space as well, the "Caserma La Longa" should become a hotel with a conference room in the former church and, finally, the Palazzo del Capitano would house the City Museum of Gradisca d'Isonzo with a section dedicated to the castle and a documentation centre of castles in Friuli Venezia Giulia. The building would also have an external space for events with a direct access to the service rooms on the southern side of the ground floor. Moreover, a wooden flooring will be placed retracing the previous addition from the XIX Century.

[119] There are no finishing layers.

The project principles are to remove later additions and to combine reversible and well recognisable actions. Despite this general approach, only a few solutions were accurately defined, as for instance: the choice of floors “alla Veneziana” in light and dark grey or the spatulated resin cement in the attic and in the basement, the stair finishing of brushed white limestone, white plastered wall, dark grey stoneware tiles in the restrooms, and, with regards to technical systems: LED spotlights, safety lighting and fire detectors. The project respects the building type and structure, as the only new additions are the lift and the partition elements in the toilets.

In order to adequately complete the sustainability analysis, both projects were considered together, for they are mostly compatible. However, in case of conflict (different solutions), the solution proposed by the more recent was considered, i.e.: the final project by Bonanno and Vanello.

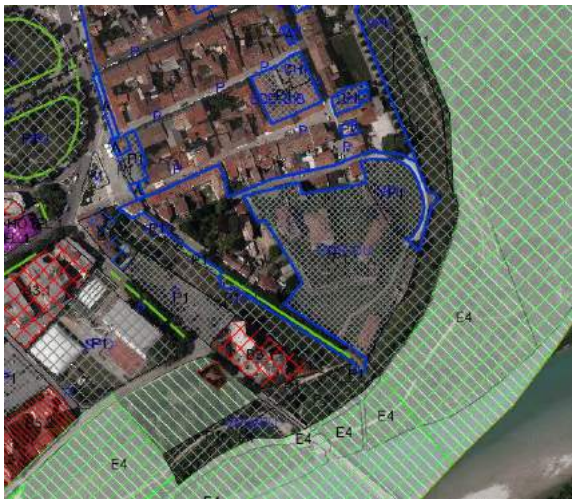
Knowing Phase

Iconographic material

LOCATION: AERIAL VIEWS, TOWN ZONING PLAN, CADASTRAL MAP

Aerial View of Gradisca d’Isonzo (Google Earth)

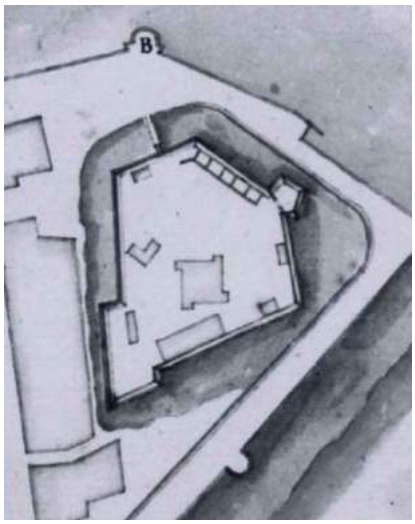
Aerial View of Gradisca d’Isonzo (Bing Maps)

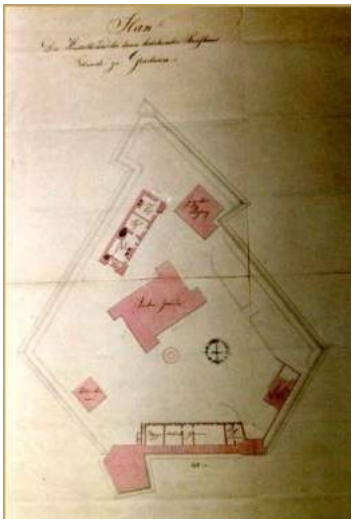


Town Zoning Plan Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

Cadastral Map Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

PAST SITUATION: ARCHIVAL MATERIAL (PROJECTS, PHOTOS, DRAWINGS, ETC.)





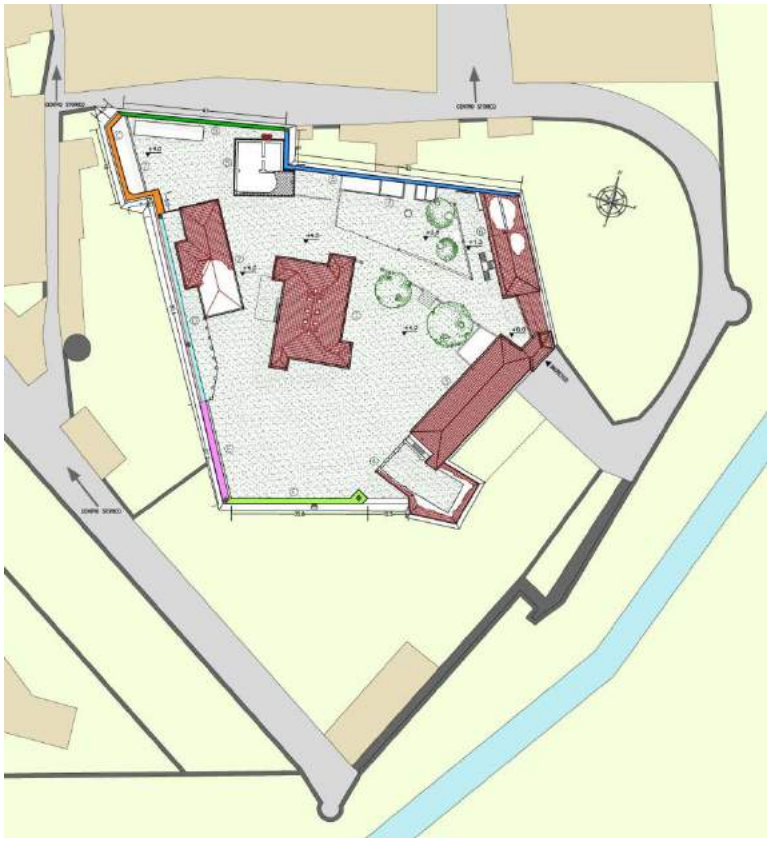
Gradisca Castle in 1824 (Studio Tecnico Bonanno Vianello, 2015)

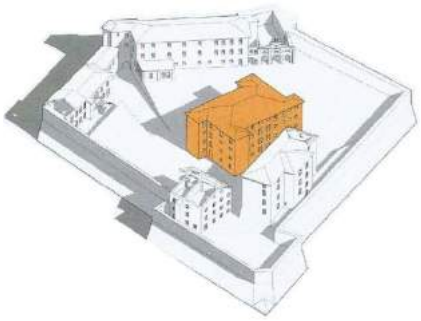
On the left:

Situation Plan of Gradisca's Fortress in 1795 (Österreichisches Staatsarchiv, Kriegsarchiv. In: Studio Tecnico Bonanno Vianello, 2015)

The Evolution of the Gradisca Castle (Studio Tecnico Bonanno Vianello, 2015)

CURRENT SITUATION: DRAWINGS, EXECUTED PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)





Above: 3d Model with the Identification of Palazzo del Capitano (Monorchio, 2010)

Left: Situation Plan (Studio Tecnico Bonanno Vianello, 2015)
Right: Identification of Buildings within the Complex (Monorchio, 2010)

Exterior Pictures

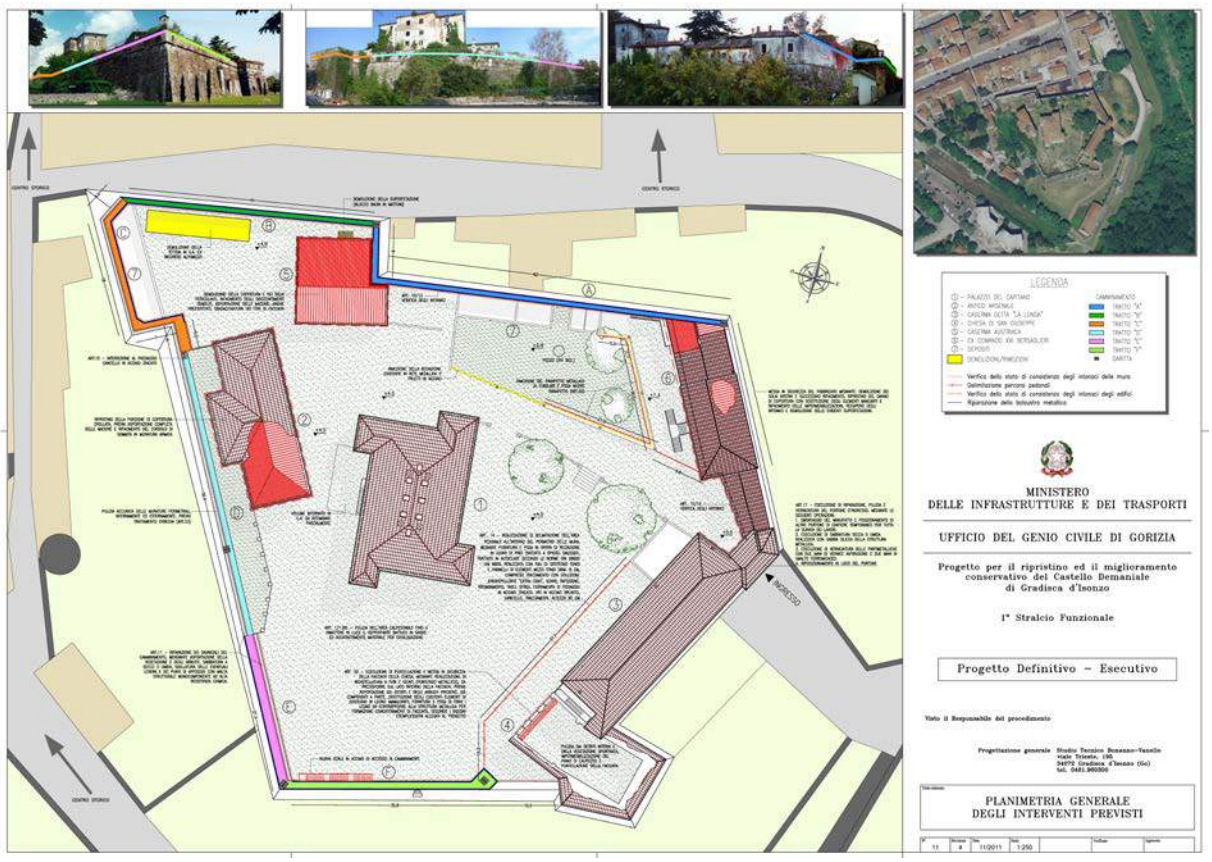
View of the Castle Complex (www.castelliere.blogspot.it)

Exterior Views of the Palazzo del Capitano (Lombardi, October 2016)

Interior Pictures

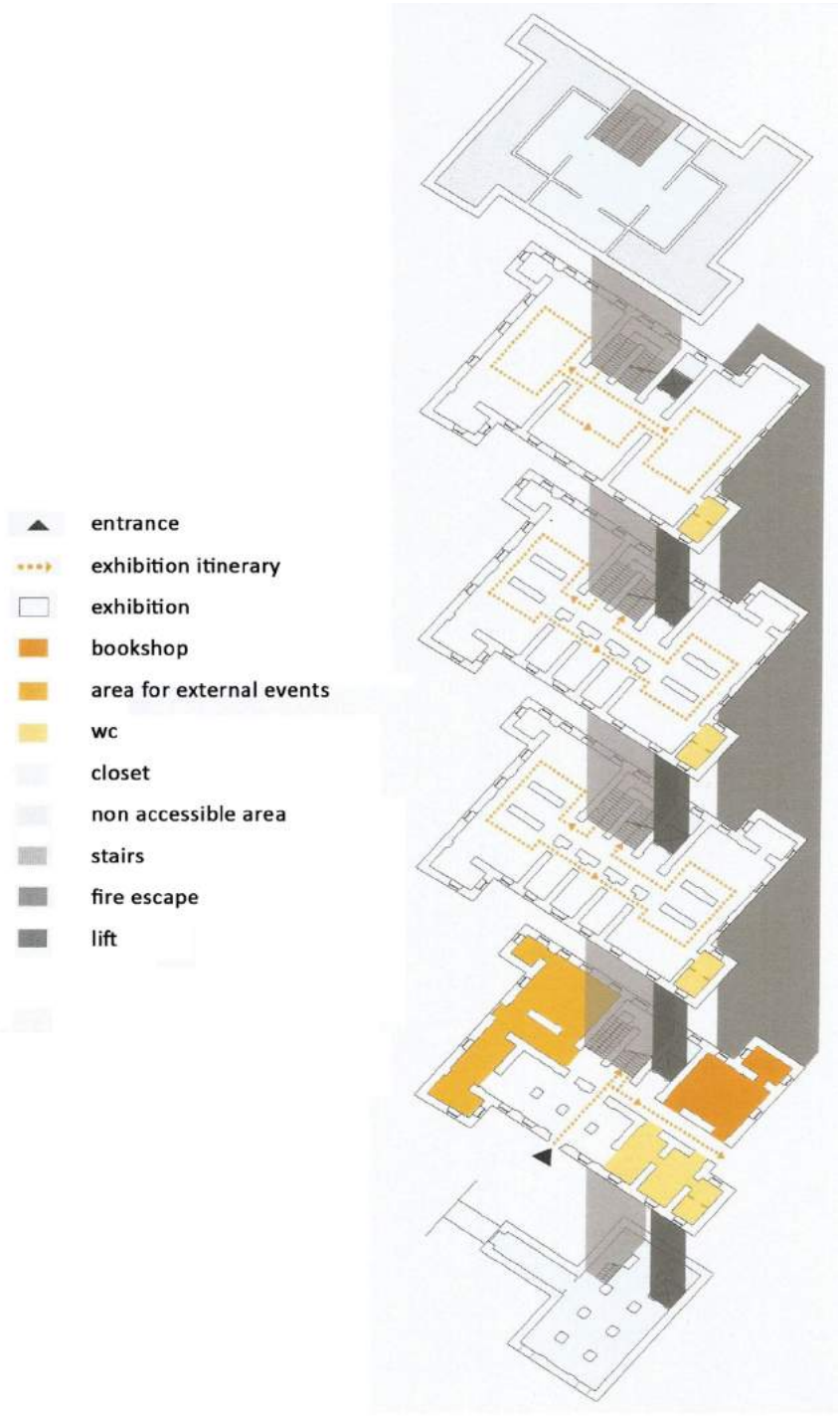
Staircase; Prison Cells on the Ground Floor; Brick Vaults (Lombardi, October 2016)

FUTURE PROJECTS: DRAWINGS, SKETCHES, PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)



Master Plan – Final Project (Studio Tecnico Bonanno Vianello, 2015)

Gradisca Castle: Project for External Areas (Monorchio, 2010)



Gradisca Castle: Palazzo del Capitano - Functional Layout (Monorchio, 2010)

BUILDING ID (PART 1) — Gradisca Castle - Pal. del Capitano

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	Palazzo del Capitano - Castello di Gradisca
	CURRENT PROPERTY:	Demanio dello Stato (State property)
	MANAGER AUTHORITY/SITE MANAGER:	Municipality of Gradisca d'Isonzo
	TYPE:	urban castle
	STYLE:	18th Century Austrian castle
	YEAR/PERIOD OF CONSTRUCTION:	1560 ca.
	AUTHOR/DESIGNER:	unknown
	ORIGINAL USE/FUNTION:	military fortress
	ACTUAL USE/FUNCTION:	abandoned
	CONSERVATION STATUS:	good; partially restored (incomplete)
LOCATION	*NATION:*	Italy (IT)
	MUNICIPALITY:	Gradisca d'Isonzo
	CITY/TOWN/LOCALITY:	Gradisca d'Isonzo
	ZIP CODE:	34072
	ADDRESS & CIVIC No°:	via del Castello
	COORDINATES:	45° 53' 16'' N; 13° 30' 15'' E; OR 383936, 5082702 (UTM: x, y)
	ALTITUDE MSL [m]	33
	CLIMATIC ZONE [DD]:	2333
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	E124 - Gradisca d'Isonzo
	CADASTRAL MAP/subject No°:	20
	PARCEL/CAD. UNIT:	118/1
NUMERICAL DATA - site	*LOT AREA [m^2]:*	7432
	COVERED AREA [m^2]:	2072
	UNCOVERED AREA [m^2]:	5360
	BUILT AREA [m^2]:	2200,00
NUMERICAL DATA - building	*No° OF STOREYS ABOVE GROUND:*	4
	No° OF STOREYS UNDERGROUND:	1
	TOTAL STOREY No°:	5
	PLANT AREA [m^2]:	560
	AVERAGE HEIGHT [m]	16,5
	TOTAL NET AREA [m^2]:	1479
	TOTAL VOLUME [m^3]:	4437,30
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	zone P1: ordinary collective services
	SPECIFICATIONS:	PS4: Special project 4
	NOTES:	The re-use project should involve the whole complex and guarantee sufficient public services, commercial and reception activities. Residential use is also allowed. The project should also consider adequate connections with the pedestrian zone and external parking spaces.
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	Yes
	REGULATORY REFERENCE:	L. 1089/1939, art. 2-3
	FROM DATE/YEAR:	20/10/1964
	OTHER RESTRICTIONS:	environmental heritage (DLgs 42/2004)
NOTES:	*OTHER INFORMATION:*	\

Figure 40: Gradisca Castle: Palazzo del Capitano: Building ID Part 1

BRIEF HISTORY of the Castle of Gradisca

PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
XV Century	military fortress	Republic of Venice	construction of the first buildings
1511	military fortress	Hapsburgs	From 1508 Venice Republic fights against the Hapsburgs; the fortress is occupied by the Hapsburgs from 1511, Nicolò della Torre is responsible for post-war reconstructions and renovation works (1512-1557) and the realisation of the "fortress within the fortress" - he erects an irregular pentagonal wall on a small hill near the river; Gradisca becomes part of the empire in 1521;
around 1560	military fortress	Hapsburgs	construction of: Palazzo del Capitano (Captain's palace) and Antico Arsenale (Ancient Arsenal)
1615-1617	military fortress	Hapsburgs	war period (Venice vs. Hapsburgs): reinforcement of the area outside the perimeter (walls)
1660	military fortress; prison from 1685 on	Hapsburgs	construction of other buildings within the plot: "ex caserma La Longa", "ex comando 11°Bersaglieri", other smaller buildings and a church S. Spirito (1717-1725)
1730	Palazzo del Capitano = "castellan's district"; Caserma La Longa = "soldier's district" Arsenal = arsenal with gunpowder depots	Hapsburgs	\
1783-1805	military fortress, barrakcs and prison; Palazzo del Capitano and La Longa are both military barracks	Hapsburgs / Napoleon	French attacks; the castle is renovated and enlarged: palazzo del Capitano is raised by 2 storeys (1790), the church is rebuilt and consecrated to S. Giuseppe; 1797-1805: Napoleon's siege
1805	Palazzo del Capitano = prison (327 persons); Caserma La Longa = prison (204 persons); Arsenal = warehouse	Reign of Italy	\
1815	military fortress and prison (political)	Hapsburgs	building renovation and restoration: new church (1828); Palazzo del Capitano's distribution is modified: small rooms instead of a large one, connected with a central corridor, a new stone stair leads to the upper floors
1827	military fortress and prison (political)	Hapsburgs	Palazzo del Capitano is enlarged: a new, adjacent construction is built with working spaces for prisoners; new addition on the opposite side (1834) - the building has doubled
1846	Palazzo del Capitano = men's prison with kitchen, food storage, bathroom; Arsenale = women's prison with laundry	Hapsburgs	all other buildings host residences for guardians, officers etc.
WWI	abandoned	Hapsburgs / Reign of Italy	the castle is badly damaged
1919-1940	military prison	Reign of Italy	several modifications: demolition of Austrian symbols, removal of the yellow plaster from the building La Longa and gratings, general repainting; 1925: settlement of the 11° Reggimento Bersaglieri (military corps), enlargement of La Longa (E); 1934: reorganisation of the natural environment

BRIEF HISTORY (continuation)			Gradisca Castle - Pal. del Capitano
PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
WWII	military prison	Reign of Italy	1943: prisoners flee, the castle complex is pillaged by local inhabitants; 1944: German soldiers occupation: castle renovation and repainting (dark grey); 1945: abandoned
1946	military residence and prison	Republic of Italy	post-war reconstructions, American and British militaries live in the complex with some German prisoners
1967-1980	Palazzo del Capitano = storehouse, military offices; Caserma La Longa = private residences; Arsenale = residence, storehouse; 1980 - abandoned	Republic of Italy - Ministry of Defence	the complex is not adequately maintained (bad conditions), several projects and meetings promoted the renovation and re-use of the building; 1978-1984: RESTORATION OF PALAZZO DEL CAPITANO: later additions to the Palazzo del Capitano are demolished, reintegration of missing cornices and external walls, external plaster removal, demolition of interior partition, load-bearing structure reinforcement or reconstruction (some floor slabs), roof replacement

CONTEXT QUALITY		
LANDSCAPE QUALITY/FRAME	*urban context*	towards west: historic urban centre of Gradisca (pedestrian zone)
	natural context	Est: natural park (well organised and maintained) along the river Isonzo (sort of a meadow, fewer trees)
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	the plot is the inner historical fortress of Gradisca d'Isonzo, a town-fortress itself; the area within the castle walls is prevalently green except for the buildings that are mostly around the perimeter (apart from Palazzo del Capitano - in central position);
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	urban centre and natural/recreational context (Isonzo river)
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	commercial, cultural, recreational, administrative services
ACCESSIBILITY	*main infrastructural connections, transport facilities*	urban road and walkways (pedestrian area)

SOCIAL VALUE		
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	The whole castle complex is the core of Gradisca d'Isonzo, not only historically but also geographically - even if situated on the city centre border, it is in a strategical position, included between the pedestrian commercial zone and the natural Isonzo area. Both characters - architectural and natural - are also appreciable within the castle area.
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	\
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use*	Due to its "central" position, people perceive it as a part of the city that should be opened and used by public.
SPIRITUAL VALUE	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*	\

ARCHITECTURAL QUALITY		Gradisca Castle - Pal. del Capitano
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	representativeness and massive appearance of the building with visible stone masonry;
	decorative elements (exterior and interior)	cornice, window frames, entrance portal
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	\
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	\
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	\
TYPE/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	historic character and common castle-type with a rectangular plant and four angular towers
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	\

PRESERVATION DIRECTIVE	
Summarise directive and restrictions from the authority in charge for the preservation of the subject.	Palazzo del Capitano: interventions should preserve the building type as well as signs of past modifications. Any architectural details that shall be discovered should be adequately managed, in order to be appreciated.

BUILDING ID (PART 2) — Gradisca Castle - Pal. del Capitano

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	GROUP ELEMENTS	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
A SUBSTRUCTURE	A01 Foundations	n.d.	\	\
	A02 Slab on Grade			
	A03 Basement walls	calcareous stone blocks, medium dimensions, wall width 60-80 cm	calcareous stone	n.d.
B SUPERSTRUCTURE (load-bearing)	B01 Frame			
	B02 External Walls	calcareous stone blocks, medium dimensions, wall width 40-50 cm	clay brick mortar (n.d.)	good, restored
		brick masonry (brick blocks, perforated or solid)	clay blocks mortar (n.d.)	reconstructed portions
	B03 Internal Walls	masonry (hollow bricks) and mortar, width 8 cm	clay brick mortar (n.d.)	good, new construction
	B04 Upper floors	groined vault of clay bricks reinforced with concrete	clay, concrete, steel	reinforced during last renovation
		concrete groined vault	concrete, steel	reconstructed floors
		hollow clay floor slab	clay, concrete, steel	reconstructed floors
	B05 Roof	pitched roof with hollow tile roof slab	clay tiles, concrete, steel	reconstructed
	B07 External stairs			
	B08 Internal stairs	reinforced concrete stairs	concrete, steel	reconstructed
	B09 Projections			
C PARTITION & CLOSURE	C01 Interior partitions	bricks and mortar	clay brick mortar (n.d.)	good
	C02 Internal doors	wooden doors of the prison cells on the ground floor	wood, iron	good; other doors are missing
	C03 External doors	wooden side door; main iron gate	wood (n.d.), iron	overgrown with vegetation (side door); iron gate is oxidated
	C04 Windows	various types: wooden frame and double glazing; some are provided with iron grating	wood (n.d.) glass; iron	recently substituted; some window panes are broken (vandalism); iron gratings are partially oxidated
D FINISHES	D01 External wall finishes	see structure	\	external plaster was removed during past restoration; some facades are covered with vegetation
	D02 Internal wall finishes	see structure	\	unfinished
	D03 Stair finishes	see structure	\	unfinished
	D04 Floor finishes	see structure	\	unfinished
	D05 Ceiling finishes	see structure	\	unfinished
	D06 Roof finishes	roof tiles	clay	good

Figure 41: Gradisca Castle: Palazzo del Capitano: Building ID Part 2

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	GROUP ELEMENTS	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
E DECORATIVE ELEMENTS	*E01 External wall decoration*	ancient end-plate anchors; stone plate with emblem	iron	good
	E02 Internal wall decoration			
	E03 External window & door framing	window and door frames in fine bushhammered natural stone (Istria stone)	stone (n.d.)	good
	E04 Internal window & door framing	\	\	\
	E05 Roof decoration	cornice	natural stone	good, reintegrated where missing
	E06 Balustrade and parapets			
	E07 Other			
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	iron gutters and drainpipes	iron	renovated
	F02 Plumbing	\	\	incomplete, pre-arranged
	F03 Heating	\	\	incomplete, pre-arranged
	F04 Ventilation & A/C	missing	\	missing
	F05 Electrical installations	subsurface wiring	\	incomplete and obsolete
	F06 Gas installation	n.d.	\	\
	F07 Communication installation	n.d.	\	\
	F08 Lifts & Escalators	\	\	prearranged
	F09 Fire protection	\	\	\
		OMISSIS		
	F10 Protective installation	\	\	\
G SITE EQUIPMENT	*G01 Site enclosure*	approx. 18m - high perimetral wall (width 6-2m) composing an irregular pentagon with an angular bastion (S): stone masonry, big stone blocks and natural stone cornice; slightly different dimensions depending on the period of construction; entrance portal (SE) made of white Karst stone	karst stone and sandstone mortar (n.d.); white karst stone (portal)	no structural problems; presence of vegetation and biological patina
	G02 Site paving (hard landscaping)	concrete walkways around the Captain's palace	concrete	good; presence of vegetation
	G03 Soft landscaping	grass	grass	overgrown
	G04 Site services (public utilities)	n.d.	\	\
	G05 Site buildings	Ancient Arsenal	\	all buildings are abandoned and in mediocre-bad status; Arsenal: mediocre/bad conservation status (roof partially collapsed, windows and doors are not recoverable, external plaster is badly damaged);
		Austrian military barracks (Caserma Austriaca)	\	bad c.s.; collapsed floors and roof, openings are walled-up, external plaster is largely missing;

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION				Gradisca Castle - Pal. del Capitano
MAJOR GROUP ELEMENTS	***GROUP ELEMENTS***	**DESCRIPTION**	**MATERIALS**	**CONSERVATION STATUS - DIAGNOSIS**
G SITE EQUIPMENT		Corpo di Guarda (Guardian's building)	\	bad c.s.; floors and roof have collapsed, external plaster is badly damaged and overgrown, windows and doors are not recoverable, metal elements (parapets etc.) are warped and oxidated;
		Caserma La Longa	\	mediocre-bad c.s.; elevation walls are stable, floors (nd.d.), windows and doors are not recoverable, internal and external plaster are damaged;
		Church	\	poor c.s.; only main facade and external walls are left, presenting serious structural problems
	G06 Site fittings	\	\	\

Vocationality Analysis

Table 29: Gradisca Castle: Palazzo del Capitano: Vocationality Analysis

PARAMETER GROUP	RES	PRO	ACC	C&A	PUB	min
CONTEXT QUALITY (territory)	0,669	0,319	0,611	0,564	0,575	0,319
ECONOMIC CONTEXT (area)	0,429	0,347	0,311	0,537	0,471	0,329
B&S QUALITY	0,761	0,679	0,713	0,672	0,759	0,688
B&S VERSATILITY	0,475	0,416	0,495	0,462	0,485	0,439
POTENTIALITY	0,435	0,223	0,344	0,444	0,399	0,284
COMPATIBILITY	0,491	0,396	0,470	0,412	0,484	0,404
VOCATIONALITY	0,589	0,419	0,535	0,553	0,566	0,419

Similar results, which can be grouped together, are underlined, whereas red scores should be excluded due to particularly low scoring.

Since Gradisca Castle is located between the historic town centre (with many shops and services) and the natural area of the river Isonzo, the context analysis suggests residential as the most appropriate use, then accommodation and public or c&a; by contrast the economic zone, characterised by retail and offices, places c&a first, even though the Palazzo del Capitano is not visible from outside the castle's walls. According to the same parameter, public, residence and production are also possible, while accommodation obtains here a low scoring. However, the potentiality grouping reconfirms a preference for c&a and residence, followed by public and accommodation and rather excluding production. The latter is inappropriate in the compatibility analysis too, where either residential or public uses are suitable, next accommodation and c&a last. The ranking gathers the different ordering produced by the b&s quality and versatility assessments, where the first maintains the same ranking – though excluding c&a, due to the amenity of external areas; in fact, the model weights indicate that c&a – if compared to the other possible uses – is the one less interested in the presence, quality and versatility of open areas. On the other hand, the medium level of building and site versatility[120] suggests accommodation first, then public, residence and finally c&a.

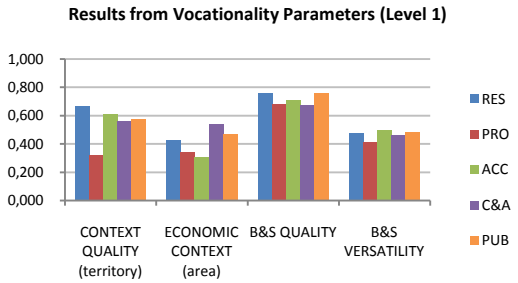


Figure 42: Gradisca Castle: Palazzo del Capitano: Chart with Vocationality Results 1

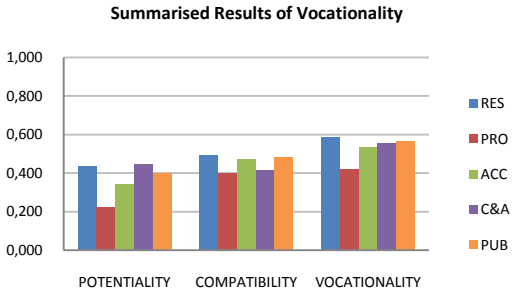


Figure 43: Gradisca Castle: Palazzo del Capitano: Chart with Vocationality Results 2

In conclusion, the vocationality summary promotes again residential use, followed by public, c&a and accommodation, and leaving out production[121].

[120] Palazzo del capitano should maintain external appearance and indoor prison cells, whereas all other modifications are allowed – except for the building enlargement. Similarly, the open area is likely to be changed, yet keeping other existing buildings, historic walkways on the top of the walls and the stairs that connect the entrance path to the higher level of ground in front of the Palazzo del capitano.
[121] For further information on vocationality analysis see the attached evaluation model of Gradisca Castle (A_VII.3).

The re-use programme proposed by Monorchio for the whole castle complex conforms to the potentiality results and the idea of turning Palazzo del capitano into a city museum is compatible with the b&s characteristics.

Sustainability Analysis

Table 30: Gradisca Castle: Palazzo del Capitano: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,506**	**21**	**4**	**53**	**70**	**75,71%**
SOCIO-CULTURAL S.	0,694	11	3	23	31	74,19%
ENVIRONMENTAL S.	0,447	9	0	19	27	70,37%
ECONOMIC S.	0,365	1	1	4	4	100,00%

The sustainability performance of the intermediate project for the Gradisca Castle, integrated with the project proposal by Monorchio for the Palazzo del Capitano, is just above the limit of sustainability with already 75% of criteria defined. However, it cannot be defined truly sustainable, for two macro-categories obtained an insufficient scoring [122].

The socio-cultural sustainability is guaranteed by the great importance of reusing the complex for the community of Gradisca. Despite the non-innovational design, there is a high quality control and attention to maintenance. On the other hand, requested structural reinforcements are quite invasive and non reversible, as well as the integration of finishing that can hardly be restored without losing original material. In spite of this, all materials are selected on the basis of careful analysis, in order to be highly compatible with the existing, yet easy to distinguish.

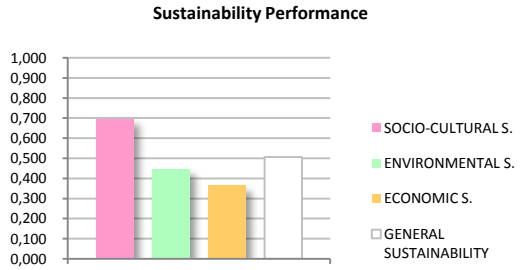


Figure 44: Gradisca Castle: Palazzo del Capitano: Chart with Sustainability Results

No thermal insulation or renewable resources are considered, but the building inertia and orientation are already good. Some solutions have a little effect on reducing pollution, while the greatest contribution to environmental sustainability is given by the improvement of external areas, which is indeed the main objective of the project.

The economic part is in this case well defined: the project has a limited extent due to limited finances, while operating costs are all covered by the local municipality (external funding and low costs); profitability is not expected, while the project's utility grade would be definitely high, although based on risky assumptions.

[122] For further information on sustainability analysis see the attached evaluation model of Gradisca Castle (A_VII.3).

4.3.2 Vila Laščak (PGD – project for building permit acquisition)

Project presentation

According to the project for the villa Laščak from 2007, the subject was meant to be used by the Faculty for post-diploma studies of the University of Nova Gorica and by the Research Centre of the Slovenian Academy of Sciences and Art (ZRC-SAZU) – branch office of Nova Gorica.

The main subject (villa) would accommodate technical spaces in the underground level; a hall, a lecture room for 30 persons, a reading room, cabinets, WCs and a club area on the ground floor; another lecture room for 30 persons, a reading room, administration offices and a club area on the first floor; on the second floor there would be an additional lecture room for 30 persons, a reading room, club areas, a small apartment for visiting professors, ZRC SAZU rooms and restrooms, while the terrace would be used for lessons in the outside and as a space for reading. Similarly to the previously described project, the park would be provided with public lighting, a new entrance and a paved parking area (asphalt) and street.

Despite the fact that the new function is here well defined, some solutions (especially those referring to the selection of materials) are still pending. In fact, the project adopts "suitable flooring" with no further specification. However, all interior partitions and most finishing are replaced with newer elements that guarantee acoustic insulation too. On the other hand, thermal insulation will be improved only with regards to windows (restored, new glazing of "termopan") and ground floor slab (substitution). All working spaces are provided with sufficient daylight, while other comfort aspects are ensured by new technical systems: HVAC (central heating), drainage, power plant, fire detection, anti-theft device, communication, etc. Their main distribution is hidden in the ground-floor (under floor level) or in the lift shaft that is not visible from outside and connects all levels but the underground and the roof.

In general, the project approach is very similar to the previous one, since both aim at bringing the villa back to its past appearance: even in this case, the southern terrace should be rebuilt as well as all missing decorations (wooden roof and balustrades, black wall decorations, etc.). However, the main difference is that, in certain cases, the PGD tries to adopt recognisable integrations, as for instance: new polished steel stairs in the tower, missing concrete decorations are reproduced in glass fibre reinforced concrete, damaged part of the brick-facade is recreated with a plaster surface.

Finally, the project obtained the building permit in 2007 (reconstruction of the villa) and 2008 (street connection)[123]. Despite this, the project was later abandoned due to the introduction of new earthquake-resistance regulations that made construction costs unsustainable.

The building ID and the vocationality analysis were reported in chapter 4.2.2.

[123] The project for execution (PZI) is from 2007 and, according to the available material, adopts the same solutions as the PGD.

Sustainability Analysis

Table 31: Vila Laščak - Intermediate Project: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,559**	**17**	**3**	**57**	**71**	**80,28%**
SOCIO-CULTURAL S.	0,725	6	0	28	34	82,35%
ENVIRONMENTAL S.	0,614	10	2	18	25	72,00%
ECONOMIC S.	0,341	1	1	4	4	100,00%

The general sustainability level of the intermediate project for the vila Laščak – combined with the preliminary proposal from 2014[124] – is sufficient with a good reliability as well (80%). Looking at the macro-categories' performance it can be observed that socio-cultural and environmental areas obtained satisfying results, while the economic domain is very low, which also makes the whole operation not sustainable.

The model also shows that in this section all answers were given, so that the project is not economically feasible due to partial financeability, high operating costs that must be covered with external funding (not self-financing with the building new activity) and relatively high risk. The only positive aspect are the positive externalities and benefits on the context deriving from the building re-use.

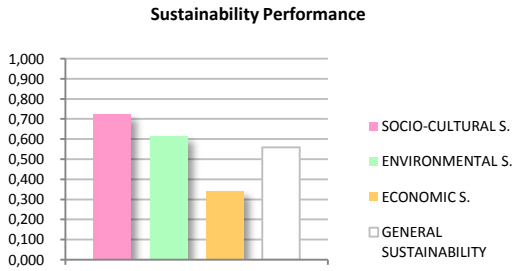


Figure 45: Vila Laščak - Intermediate Project: Chart with Sustainability Results

Environmental sustainability is generally well performing, thanks to the results from environmental quality (improvement of external green areas, parking facilities and low impact on neighbourhood), while ecological impact is only in part limited through the prevention of pollution during construction and the building operation. Despite the fact that renewable resources are not used for energy production, the overall energy efficiency is not bad, due to the potentialities deriving from the building orientation.

Also in this case study, socio-cultural is the best performing among the three macro-categories: the project pays a great attention to the user's comfort and perception as well as to the public use & benefit. Moreover, it respects all regulation standards but seismic safety. Adopted solutions and materials are generally compatible, reversible and not so invasive, with the only exception of structures. By contrast, the proposed integrations and "historical" reconstructions might reduce the building authenticity and neither would be easy to recognise; however, despite the low scoring in this section, the socio-cultural sustainability seems not to be affected much, for the recognisability parameter had been assigned a low weight by the experts.[125]

[124] Answers from the preliminary project are reported in case of missing information (the intermediate project does not consider a certain aspect) or when the two proposals are in contrast, which means, that when the assessments for a certain criterion are different, the most recent solution prevails – in this case the preliminary project from 2014.

[125] For further information on sustainability analysis see the attached evaluation model of vila Laščak (A_VII.2).

4.4 APPLICATION AT THE FINAL PLANNING STAGE / POST-COMPLETION

4.4.1 Ex O.P.P. (Psychiatric hospital complex): New Mental Health Centre – Gorizia

Introductory information

The New mental health centre is part of the historic complex of the psychiatric hospital of the Province of Gorizia. Situated in the beautiful Basaglia Park, SW of Gorizia's centre and next to the border to Šempeter (Slovenia), it used to be the place where all the food for the hospital was prepared. The construction was rebuilt after WWI between 1928 and 1933, respecting the original plan from 1911. In 1980s it was turned into a clinic archive and apartments and it was abandoned only in 2013, when restoration works started. The new Mental Health Centre was finally inaugurated on the 30th September 2016.

Project presentation

The construction project management was entirely developed by Starassociati studio (Trieste), who also participated at the sustainability testing of their work that will be presented hereafter.

Their project respects the original H plan of the building and re-establishes the central double-height space. Restoration interventions are applied to windows, doors, external decorative elements and some interior floorings alla Veneziana[126], whereas the space configuration and distribution are completely new: two lifts were introduced and a gallery on the first floor connects the two wings where the patients' and medical rooms are located. Such changes are mostly recognisable thanks to their rotated position, even if this is not true for the new partition of the wings.

The project is not a restoration operation but rather a revitalisation, where conservative interventions face with new construction too, as in the case of the external "sailing ship" in zinc coated-steel – the addition of a four-level structure with two terraces and solar protection systems on the southern facade. Apart from this, the exterior appearance is mostly the same as it used to be: 85% of wall plaster is maintained, all decorative elements, windows and windowsills are original and easy distinguishable from new integrations thanks to a different material or because some imperfections were not removed from original pieces. On the other hand, the under-roof decoration on asbestos sheets was replaced reproducing the drawing on a new material (aluminium plate) with the same technique that was used in the past. Even interior plaster layers are mostly conserved thanks to new counter walls that leave a technical space too. Unexpectedly, no thermal insulation was inserted[127] and the only improvement in this direction – apart from the installation of better performing technical systems – is the substitution of window glazing. With regards to floors, terrazzo alla Veneziana is the only preserved, whereas the previous unrefined boarding was replaced.

The project mainly applies a conservative, recognisable and reversible approach. Nevertheless, interventions for structural reinforcement are rather invasive: existing floor in hollow-core concrete structures were strengthened with steel plates that were anchored to brick walls and with a structural screed of reinforced concrete. On the other hand, 20% of wooden beams were substituted and connected to the upper concrete slab, whereas brick walls and cavities were locally integrated with similar bricks for better toothing.

[126] This means that all these original elements were preserved and cautiously adjusted or modified.
[127] The designers wanted to prevent interstitial condensation.

Knowing Phase

Iconographic material

LOCATION: AERIAL VIEWS, TOWN ZONING PLAN, CADASTRAL MAP

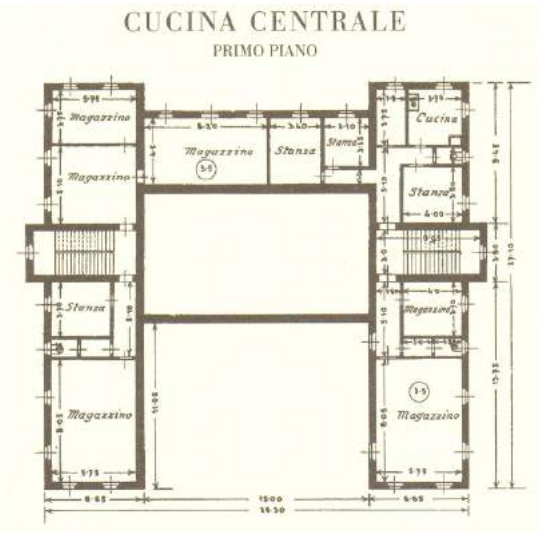
Aerial View of the Ex O.P.P. Complex (Google Earth)

Aerial View of the Ex O.P.P. Complex (Bing Maps)

Town Zoning Plan Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

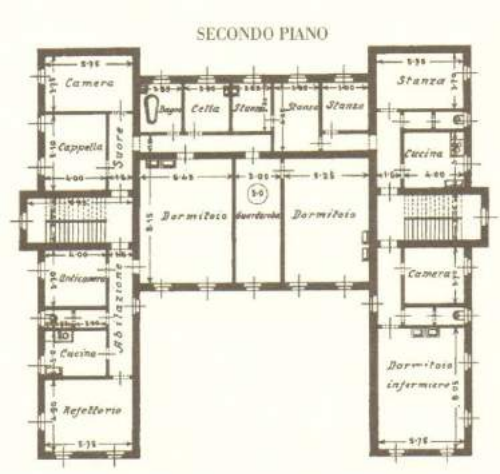
Cadastral Map Extract
(Eagle FVG: http://www.sistemigrafici.insiel.it/PRG/)

PAST SITUATION: ARCHIVAL MATERIAL (PROJECTS, PHOTOS, DRAWINGS, ETC.)



Above: Southern Facade in 1933 (OPP, 1933)

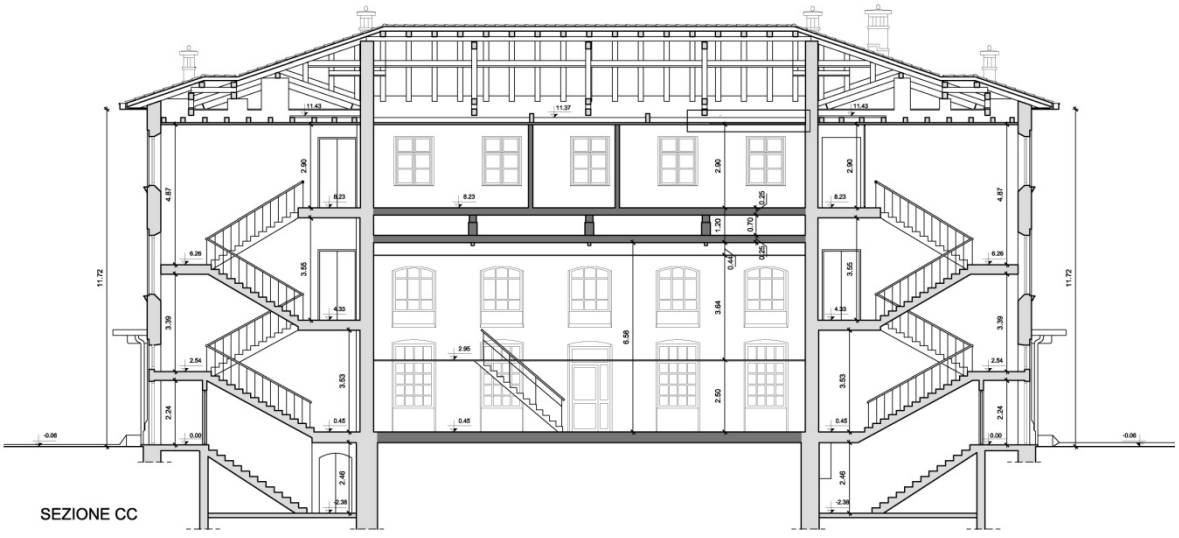
Left: Ground Floor Plan 1933 (OPP, 1933)



Central Cooking Area in 1933 (Above) and Second Floor Plan (OPP, 1933)

Exterior (2010) and Interior Pictures (2012) of the Former Food Preparation Building before Renovation (Lombardi, September 2010 and October 2012)

Below: Longitudinal Cross-section in 2009 (Starassociati, 2016)



CURRENT SITUATION: DRAWINGS, EXECUTED PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)

Project for the New Mental Health Centre (Starassociati, 2016)

EXTERIOR PICTURES

View from the South-west Corner (Starassociati, 2016)

INTERIOR PICTURES

Indoor View of the Central Hall (Starassociati, 2016)

Staircase and Room for Group Activities on the Ground Floor (Lombardi, September 2016)

Patient's Room and Bathroom (Lombardi, September 2016)

BUILDING ID (PART 1) — Ex O.P.P.(Psychiatric Hospital)

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	Nuovo CSM, ex-cucine, Edificio H - cucina centrale - archivio e appartamenti
	CURRENT PROPERTY:	Azienda per l'Assistenza Sanitaria - n.2 Bassa Friulana - Isontina
	MANAGER AUTHORITY/SITE MANAGER:	Azienda per l'Assistenza Sanitaria - n.2 Bassa Friulana - Isontina
	TYPE:	isolated building, part of a complex in a park
	STYLE:	\
	YEAR/PERIOD OF CONSTRUCTION:	1928-1933 (post-war reconstruction)
	AUTHOR/DESIGNER:	Silvano Barich it. Baresi
	ORIGINAL USE/FUNTION:	kitchen, food preparation for the psychiatric hospital complex
	ACTUAL USE/FUNCTION:	mental health centre
	CONSERVATION STATUS:	restored (opening: September 2016)
LOCATION	*NATION:*	Italy (IT)
	MUNICIPALITY:	Gorizia
	CITY/TOWN/LOCALITY:	Gorizia
	ZIP CODE:	34170
	ADDRESS & CIVIC No°:	Via Vittorio Veneto, 174
	COORDINATES:	45° 55' 55,39'' N; 13° 37' 51,99'' E; OR 2413875, 5087432 (x, y)
	ALTITUDE MSL [m]	77
	CLIMATIC ZONE [DD]:	2333
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	E098 - Gorizia
	CADASTRAL MAP/SUBJECT No°:	26
	PARCEL/CAD. UNIT:	.1949
NUMERICAL DATA - site	*LOT AREA [m^2]:*	1296
	COVERED AREA [m^2]:	704
	UNCOVERED AREA [m^2]:	592
	BUILT AREA [m^2]:	873,70
NUMERICAL DATA - building	*No° OF STOREYS ABOVE GROUND:*	3
	No° OF STOREYS UNDERGROUND:	1
	TOTAL STOREY No°:	4
	PLANT AREA [m^2]:	704
	AVERAGE HEIGHT [m]	13,5
	TOTAL NET AREA [m^2]:	1601,05
	TOTAL VOLUME [m^3]:	5230,00
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	C - strategic transformation area n.5
	SPECIFICATIONS:	see: NTA art. 32
	NOTES:	buildings must establish a contact with the park (walkways, ramps, stairs etc.)
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	yes; cultural heritage
	REGULATORY REFERENCE:	D.Lgs. 42/2004, art.10
	FROM DATE/YEAR:	08/05/2008
	OTHER RESTRICTIONS:	YES; PRG: Buildings characterising a part of the city (Group 3)
NOTES:	*OTHER INFORMATION:*	located in a protected urban park: parco Basaglia

Figure 46: Ex O.P.P.: Building ID Part 1

BRIEF HISTORY			Ex O.P.P. (Psychiatric hospital)
PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
1905-1911	kitchen / food production	public authority	first construction period (designer: Arthur Glessig)
1916	kitchen / food production	public authority	partially demolished during WWI bombing
1928-1933	kitchen / food production	Province of Gorizia	post-war reconstruction according to Barich's project that mostly reconfirms the original setting, but adds a storey overground
1980s	clinic archive	USL (local health authority)	a mezzanine was added in the central double-height space for documentation filing
until 2008	temporary residence	ASS (local health authority)	\
2013-2016	new Mental Health Centre (CSM)	AAS (local health authority)	building renovation and restoration: creation of an internal walkway on the 1st level in the double height space, installation of two lifts and modern technical equipment, new space subdivision, floor slab reinforcement, addition of a discending platform (N) and of a multi-level "terrace" construction (S)

CONTEXT QUALITY		
LANDSCAPE QUALITY/FRAME	*urban context*	the building is part of the historic complex of Gorizia's psychiatric hospital, formed by different isolated buildings in a green park (Basaglia park); the whole plot is situated along the border with Slovenia, and more precisely, the municipality of Šempeter-Vrtojba, whose centre (Šempeter) is about 650 m SE
	natural context	the building is situated in the historic Basaglia park; there are some fields (S, SW) and some green areas around the former civil hospital across the road
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	historical situation: Basaglia park used to be (as nowadays) rich in biodiversity; the whole plot of the psychiatric hospital used to be 30 ha with a large agricultural colony, in a completely isolated position (with regards to Gorizia's urban centre) currently: surrounded by private fields (S, SE); due to urban expansion the Basaglia complex is nowadays included in a low-density built environment, between the city centres of Gorizia and Šempeter
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	mixed: agriculture (S), health service (N), residential (E and W)
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	health services, public transport, commercial facilities further SW
ACCESSIBILITY	*main infrastructural connections, transport facilities*	local road intersecting main entrance road from Triest to Gorizia centre

SOCIAL VALUE		
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	The building is situated in a protected historic park; even if the construction is an integrating part of the historic complex (that was once aesthetically harmonious), Gorizia's citizens don't seem particularly conscious of its meaning and importance; the difficulty is probably a consequence of its function (psychiatric hospital) that was always marginalised and separated from urban life. On the contrary, the building is certainly of great importance to the community of patients and workers.
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	The building is part of the psychiatric complex, where dr. Franco Basaglia tested his new approach to psychiatry that was later codified in the Basaglia Act from 1978.
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community (...)*	\
SPIRITUAL VALUE	*intangible values and meanings (...)*	\

ARCHITECTURAL QUALITY		Ex O.P.P. (Psychiatric hospital)
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	the building has an "H" plant, with the wider court embracing the Basaglia park to the North with a small projecting roof, whereas the southern court is minor and faces the wash-house; construction details and similar decorative elements link the building to the others nearby giving a sense of unity to the whole complex; unfortunately past renovations have reduced this harmony (different paint colours, non-reproduction of certain decorations etc.)
	decorative elements (exterior and interior)	under-eaves decoration, basement and prefabricated windowsills, gutter "funnel", chimneys
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	decorative apparatus and other details reveal Barich's personal style and demonstrate the great attention that was once paid to details, aesthetic appraisal and construction quality
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	\
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	building by arch. Silvano Barich, an important designer who operated mainly in Gorizia and Grado in the first half of the XX Century; the building is then indirectly connected with Franco Basaglia's experimental treatments
TYPE/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	the complex emulates the innovative hospital configuration launched in 1893 with the Alt-Scherbitz complex in Leipzig that promoted a new solution, composed of different pavillions located in a green, neat area according to a symmetrical arrangement of the buildings (female separated from males and common buildings along the plot's central axis). The symmetry is again present in all the constructions (symmetrical plan and facades), in order to give a sense of order and calm. Gorizia's project was also published in an important magazine of the early XX Century, read all over the Austro-Hungarian empire: Allgemeine Bauzeitung. Barich's reconstruction reconfirmed the original disposition.
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	The building construction materials and systems are traditional: brickworks, concrete and prefabricated concrete elements, wooden windows and shutters, wooden roof structure and rooftiles finishing.

PRESERVATION DIRECTIVE	
Summarise directive and restrictions from the authority in charge for the preservation of the subject.	Building external appearance must be mantained: all decorative elements must be preserved and the paint-colour should be decided through the investigation of original pigment traces and in accordance with local heritage authority. The balustrade on the balcony must be rebuilt similarly to the one of Rabatta Palace in Gorizia. Inside: groundfloor: the central double-height space must be recreated and the staircase preserved.

BUILDING ID (PART 2) — Ex O.P.P. (Psychiatric hospital)

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS (before renovation)
A SUBSTRUCTURE	*A01 Foundations*	no foundations! Directly "laid" on the ground	\	\
	A02 Slab on Grade			
	A03 Basement walls	masonry and good quality mortar	clay brick mortar (n.d.)	basement walls are humid, walls have many stains
B SUPERSTRUCTURE (load-bearing)	*B01 Frame*			
	B02 External Walls	masonry and good quality mortar	clay brick mortar (n.d.)	overall good, but there are frequent wall cavities
	B03 Internal Walls	masonry and mortar	clay brick mortar (n.d.)	good
	B04 Upper floors	concrete slab on grade	concrete (probably not armed)	notwithstanding current hygiene and health requirements
		hollow clay floor slab above basement	clay, concrete, steel	additional supports were added to prevent collapse
		hollow clay floor slab (mixed), many floor structures were reconstructed adopting mixed solutions	clay, concrete, steel	good, but not satisfying earthquake-resistance prescriptions
		wooden structure (2nd floor)	larch	some are damaged and irrecoverable
	B05 Roof	wooden roofing structure and hollow flat tiles	larch	good
	B07 External stairs	concrete	concrete steel	\
	B08 Internal stairs	reinforced concrete stairs (basement), stone steps (main staircase)	concrete, steel; stone (n.d.)	good
	B09 Projections	projecting roof	iron, glass	glass panes are broken
C PARTITION & CLOSURE	*C01 Interior partitions*	bricks and mortar	clay brick mortar (n.d.)	good
	C02 Internal doors	wooden doors (single or double-fleated) with or without fanlight, varnished	wood (n.d.), brass, glass	good
	C03 External doors	three types of doors are available: double-fleated wooden door with fanlight, glass and grating (130x219 + 84 cm or 130x297 cm); single fleated door with fanlight in aluminum and glass (140x297 cm) - later substitutions	wood (n.d.), brass, glass, iron; aluminum, glass	wooden doors are in good condition (ordinary maintenance); aluminum doors are later substitutions, incoherent with the character of the building
	C04 Windows	wooden frame, with or without shutters, with or without iron grate, with or without fanlight; there are 15 types with the following dimensions (cm): 140x212, 110x205, 80x26, 100x210, 160x293, 140x142, 110x170, 50x50 (roof windows)	wood glass; (bricks)	minor damage due to use and meteorological agents (rust on iron)

Figure 47: Ex O.P.P.: Building ID Part 2

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION				Ex O.P.P. (Psychiatric hospital)
MAJOR GROUP ELEMENTS	***GROUP ELEMENTS***	**DESCRIPTION**	**MATERIALS**	**CONSERVATION STATUS - DIAGNOSIS**
D FINISHES	*D01 External wall finishes*	external plaster	n.d.	well preserved, locally missing or damaged (<15%); paint is faded (washed out)
	D02 Internal wall finishes	internal plaster	n.d.	generally good (except underground floor)
	D03 Stair finishes	see structure	\	\
	D04 Floor finishes	terrazzo alla Veneziana (corridors and common areas), wooden floor, ceramic tiles, linoleum	marble pieces and mortar; cermaic; wood (n.d.), linoleum	except areas with terrazzo alla Veneziana, all other finishes were substituted in the past and are not made of valuable materials; floors are generally in good condition
	D05 Ceiling finishes	plaster	n.d.	good (except basement)
	D06 Roof finishes	roof tiles	clay	good, some might be misplaced
	D07 Doorstep	stone blocks	n.d.	good
E DECORATIVE ELEMENTS	*E01 External wall decoration*	stringcourse (slightly protruding)	mortar (n.d.)	good
	E02 Internal wall decoration			
	E03 External window & door framing	bushhammered stone doorframe and prefabricated concrete windowsills	stone (n.d.)	good (doorframe); some sills are chipped
	E04 Internal window & door framing	\	\	\
	E05 Roof decoration	chimneys with spherical crowning element	clay bricks, prefabricated concrete	removal of non-original elements
		under-roof decoration (eaves)	asbestos	toxic material!
	E06 Balustrade and parapets	stair parapet made of varnished wrought iron with a wooden handrail	iron, wood (n.d.)	good
	E07 Other			
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	iron gutters and drainpipes with a special ornamental joint element	iron	rust, some ornamental elements are damaged (corroded)
	F02 Plumbing	present	\	obsolete
	F03 Heating	present, boiler is in the basement	\	obsolete
	F04 Ventilation & A/C	missing	\	missing
	F05 Electrical installations	wiring is not visible, but equipment is obsolete	\	obsolete
	F06 Gas installation	present	\	\
	F07 Communication installation	n.d.	\	\
	F08 Lifts & Escalators	\	\	missing
	F09 Fire protection	\	\	obsolete
		OMISSIS		
	F10 Protective installation	\	\	\

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION				Ex O.P.P. (Psychiatric hospital)
MAJOR GROUP ELEMENTS	***GROUP ELEMENTS***	**DESCRIPTION**	**MATERIALS**	**CONSERVATION STATUS - DIAGNOSIS**
G SITE EQUIPMENT	*G01 Site enclosure*	none related to the building close area; with reference to the whole complex: there is a wall and metal mesh/plastic mesh all around the property	\	\
	G02 Site paving (hard landscaping)	concrete	concrete	\
	G03 Soft landscaping	grass	grass	\
	G04 Site services (public utilities)	all main installations	\	\
	G05 Site buildings	other pavillions that are part of the former psychiatric hospital; some are abandoned, others were already renovated	\	\
	G06 Site fittings	\	\	\

Vocationality Analysis

Table 32: Ex O.P.P.: Vocationality Analysis

PARAMETER GROUP	RES	PRO	ACC	C&A	PUB	min
CONTEXT QUALITY (territory)	0,592	0,427	0,530	0,491	0,527	0,459
ECONOMIC CONTEXT (area)	0,429	0,347	0,311	0,537	0,471	0,329
B&S QUALITY	0,743	0,539	0,723	0,555	0,711	0,547
B&S VERSATILITY	0,446	0,410	0,478	0,444	0,443	0,426
POTENTIALITY	0,395	0,266	0,307	0,408	0,374	0,286
COMPATIBILITY	0,465	0,333	0,465	0,346	0,435	0,340
VOCATIONALITY	0,554	0,413	0,508	0,504	0,531	0,413

Similar results, which can be grouped together, are underlined, whereas red scores should be excluded due to particularly low scoring.

Most groups of parameter mark production as an incompatible use for the former food preparing building within the psychiatric hospital complex.

The context quality analysis ranks first residential use, which is also the last function that the building had before its renewal. The beautiful Basaglia Park, the well serviced location (public transport, urban infrastructure, highway proximity) at the town edge are all optimal features for living purposes. In fact, accommodation and public are second, followed by c&a.

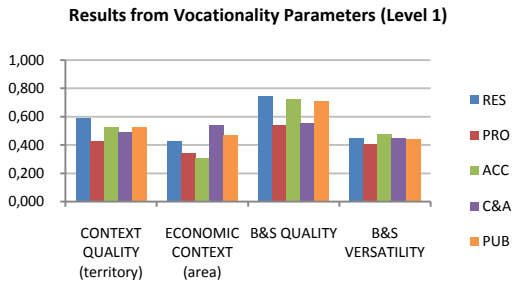


Figure 48: Ex O.P.P.: Chart with Vocationality Results 1

As already stated before, the economic context prefers homogeneous clusters, therefore, since the complex is today mainly used as a healthcare administration centre, offices and public uses are preferable, whereas accommodation gets a low score due to the scarce visibility of the building itself[128].

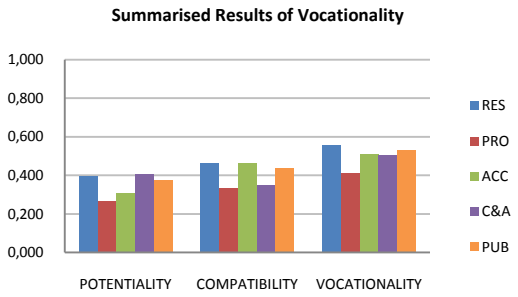


Figure 49: Ex O.P.P.: Chart with Vocationality Results 2

The historic building of big dimensions, the beautiful green area and the availability of other constructions ensure that b&s qualities are interesting for residence, next accommodation, public and c&a. Even if the result is plausible, the model is here not able to consider that the "secondary" buildings are here not garages or outbuildings but similar or even larger constructions. The user should, therefore, appropriately consider the ranking proposed.

Lastly, the building has a good level of versatility, which favours all uses; however, the fact that it is situated in a protected environment definitely affects the ranking of preferences with accommodation leading and the other three (production excluded) equally second.

The final vocationality puts residence at first place, then public, accommodation and c&a third. In this case, despite the "administrative zone", offices are last; the explanation is mainly in the availability of a big and

[128] The building is in the centre of the Basaglia Park, far from the street.

beautiful open area, which is certainly not a negative factor for c&a, but represents a great added value for the other uses that, consequently, come before [129].

Due to the property owner and the historic function of the whole complex, the restoration project decided to re-use the building as the new Centre for Mental Health, offering some accommodation for temporary patients, medical assistance areas and rooms for collective activities.

Sustainability Analysis

Table 33: Ex O.P.P.: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,740**	**4**	**2**	**70**	**72**	**97,22%**
SOCIO-CULTURAL S.	0,829	0	0	34	34	100,00%
ENVIRONMENTAL S.	0,650	3	1	25	26	96,15%
ECONOMIC S.	0,728	1	1	4	4	100,00%

The renovation project for the new Mental Health Centre is so far the most sustainable among the six case studies. Its general sustainability level is rather high (0,740/1,00), supported by good results in single areas as well [130]. The highest scoring was obtained in the socio-cultural domain, where the only weaknesses are:

- that the public (city dwellers) could not participate in the decision process – justified by the fact that the building is part of a health complex (still in use);
- that there is no EMS documentation and creation of new jobs is not likely;
- the impossibility to achieve earthquake-resistance standards despite the construction reinforcement, which lowered the performances in “low impact”, “reversibility” and “material compatibility” of structural elements.

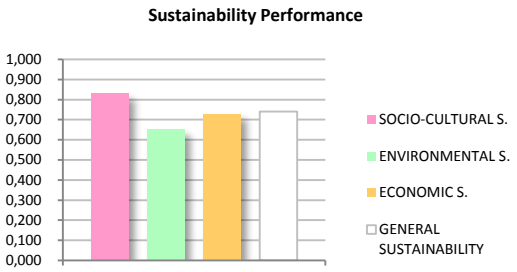


Figure 50: Ex O.P.P.: Chart with Sustainability Results

The worst is in this case environmental sustainability, which is affected by the limited reduction of energy consumption – few solutions for thermal insulations and no renewable resources are adopted – and by the parameters referring to the external area: here the evaluation could be inadequate, since the project focused only on the building renewal and never had to consider the external area; secondly, according to the cadastral map, the building does not have an external area (it is slightly larger than the building footprint); nonetheless, the building is part of the park, so, in order to make the sustainability analysis coherent with the knowing phase and the vocationality analysis, the open area had to be considered.

Finally, the economic part is also sustainable with its high grade of utility, total financeability and rather low risk: in fact, the initial budget (and cost estimate) were increased a lot due to unexpected fire-safety measures. The project was revised before the restoration works started and an additional funding made the realisation possible.

[129] For further information on vocationality analysis see the attached evaluation model of Ex O.P.P. (A_VII.4).
[130] For further information on sustainability analysis see the attached evaluation model of Ex O.P.P. (A_VII.4).

4.4.2 Vila Vipolže – Goriška Brda

Introductory information

The subject is situated in Slovenia, in the village of Vipolže, located in the famous wine producing area of Brda. Probably it dates back to the 11th Century, but since then has undergone several modifications that turned the medieval castle into a late-Renaissance villa with some Venetian influence (Seražin, 2006). Even if it had eventually fallen into disrepair, it had occasionally been used by local communities until the recent renovation: the idea of re-using this subject, so important to nearby inhabitants, but also appreciable as an example of cultural heritage, occurred in 2003. Only three years later a feasibility analysis determined its new purpose – a multicultural centre – that was realised between April 2013 and October 2015, when the building was finally opened to public. Today it is managed by the Institute for Tourism, Culture, Youth and Sport of the Municipality of Brda that locates the basement level as a restaurant, runs the villa's museum on ground floor and organises cultural meetings in the second floor with the possibility of accommodating foreign artists in the upper apartments.

Project presentation

The renewal project was developed by the architects Mitja Skubin, Nataša Leban Lavriša, Andreja Ravljen and the interior designer Andrej Mlakar. Its performance was supervised by the Institute for the protection of cultural heritage of Nova Gorica (ZVKDS OE NG) and was carried out with European funds by the Ministry of Culture of the Republic of Slovenia.

Before the renovation works started, the villa was in a bad state of conservation with some collapsed floor structures and structural problems, walled-up openings and serious water infiltration problems at the basement level. The renovation project maintained all recoverable floor structures and re-built the missing ones respecting the original position (quote). The northern facade was reinforced (under ground level) with reinforced concrete membranes that also leave an aerated space between the new wall and the existing in order to solve the moisture problem of the basement. All load-bearing walls were consolidated and injected with hydrophobic substances (basement walls in particular), while floors and screeds were removed up to the structure (excluded) and replaced with a lighter layer and a reinforced concrete screed that was well anchored to walls.

The roof had been recently restored, so that the project proposed only to check and then to secure the existing chimneys. External facades were completely renovated: the missing plaster was added, all windows were substituted or installed – as many openings had been walled up – according to the original appearance and stone elements were better anchored to walls. Missing parts were integrated according to existing pieces and are mostly distinguishable from the original ones, even if the main objective was to re-create the historical facade.

On the contrary, interiors are rather modern, especially in reference to the equipment, designed with 'straightforward lines, natural colours and ecological materials' and avoiding recreation of historical forms' 131. In addition to this, all the technical equipment is new: a zone-controllable HVAC system was installed with hidden conduits and well visible thermal convectors. All levels are fully accessible thanks to a modern lift located in the western tower, whereas in the attic of the eastern tower some historical (restored) wall paintings can be seen. In spite of this, interventions on interior finishes are rather invasive and irreversible.

The project has re-arranged open spaces too, providing the building with a sufficient parking space that can also be used for other purposes (e.g.: outdoor events). Paved walkways are provided with automatic lighting, bins and benches, as well as modern bicycle stands. At the right of the front gate there is a recycling collection area, while the area in front of the building entrance was completely redesigned: below the green lawn there is

[131] http://www.openhouseslovenia.org/index.php?m_id=vodnik&id=553

an underground technical space with a water reservoir for fire protection. By contrast, the old cypresses are still framing the wonderful view of surrounding vineyards.

Knowing Phase

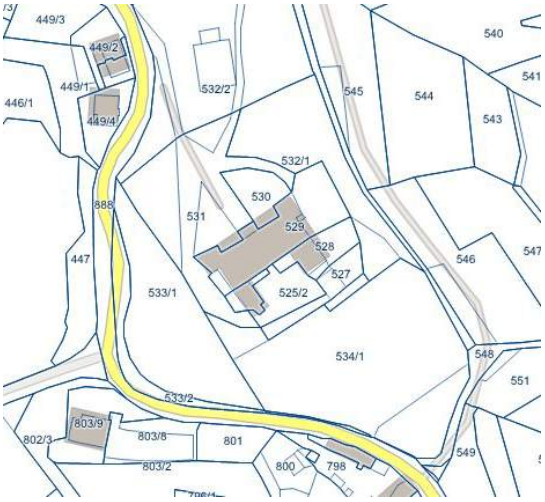
Iconographic material

LOCATION: AERIAL VIEWS, TOWN ZONING PLAN, CADASTRAL MAP

Aerial View of Vila Vipolže (Google Earth)

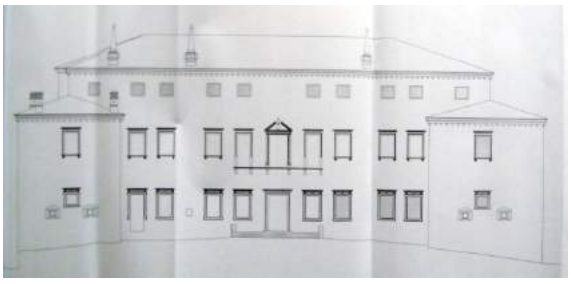
Aerial Photo of Vila Vipolže (www.gradvipolze.eu)

Town Zoning Plan Extract
(PISO: https://www.geoprostor.net/piso)



Cadastral Map Extract
(PISO: https://www.geoprostor.net/piso)

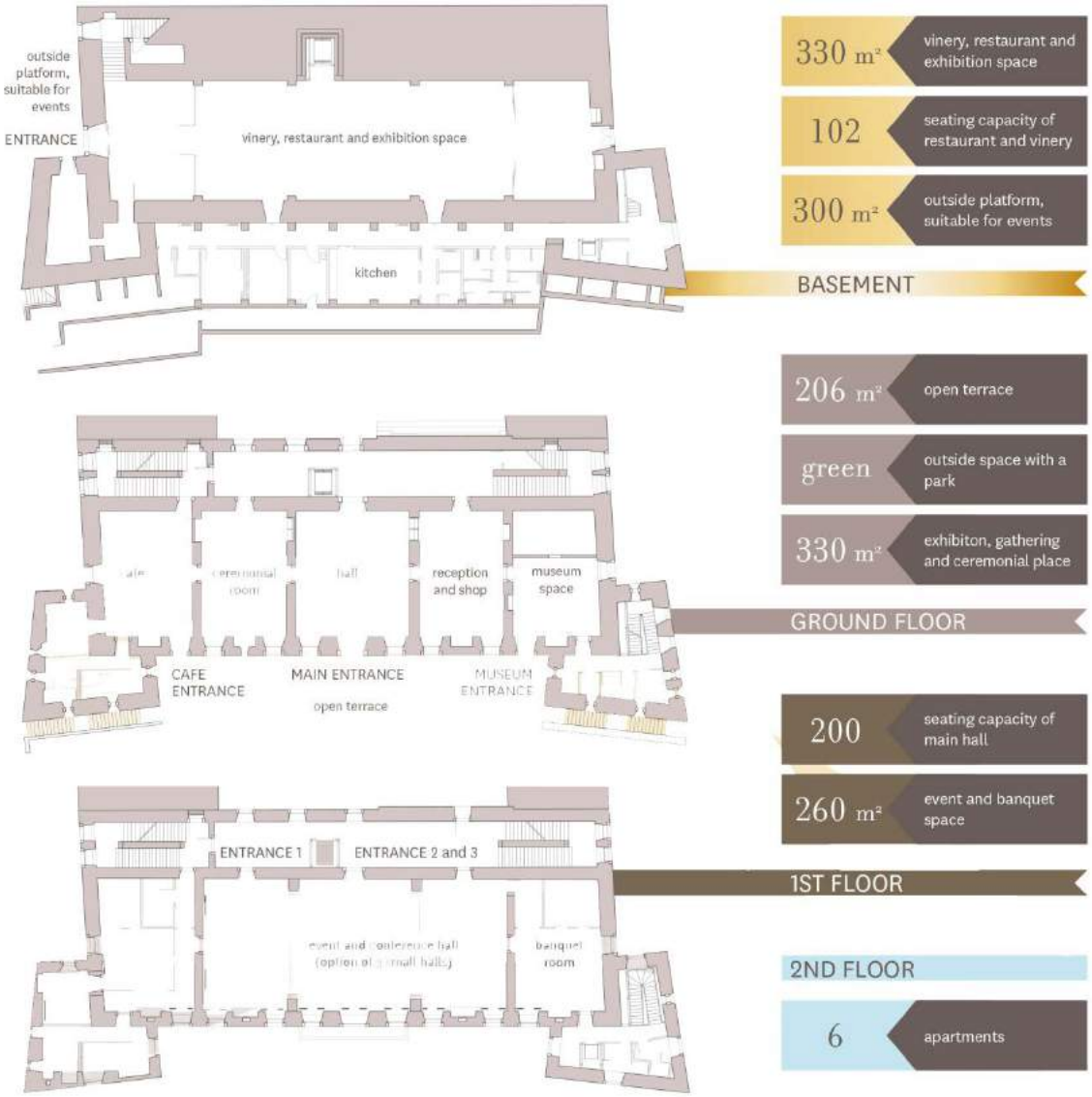
PAST SITUATION: ARCHIVAL MATERIAL (PROJECTS, PHOTOS, DRAWINGS, ETC.)



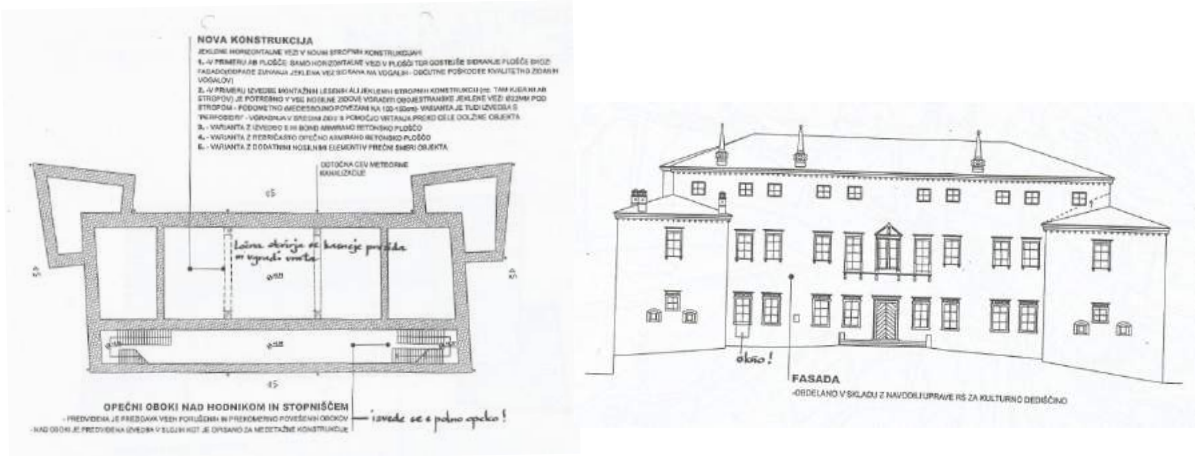
Main Facade before Renovation (Projekt d.d., 2003)

During Renovation (www.skyscrapercity.com)

CURRENT SITUATION: DRAWINGS, EXECUTED PROJECTS (PLANS, FACADES, CROSS-SECTIONS OR OTHER RESPRESENTATIONS)



Multi-cultural Centre Vila Vipolže (Vila Vipolže brochure, available at: www.kongres-magazine.eu)



Plan of Level 1 and Main Facade with Preservation Prescriptions (Mozetič, 2003)

Exterior Pictures

Main Facade after Renovation; View of the Park and of the Entrance (Lombardi, September 2016)

Interior Pictures

Basement Level and Hall on the Ground Floor (Lombardi, September 2016)

Main Room on the 1st Floor and Wall Paintings in the Attic (Lombardi, September 2016)

BUILDING ID (PART 1) — Vila Vipolže

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	Villa/Castle Vipolže
	CURRENT PROPERTY:	Republic of Slovenia - Ministry of Culture
	MANAGER AUTHORITY/SITE MANAGER:	Zavod za turizem, kulturo, mladino in šport Brda (Institute for Tourism, Culture, Youth and Sport Brda)
	TYPE:	isolated villa
	STYLE:	late Renessaince, Friulian villa type with Venetian baroque decoration
	YEAR/PERIOD OF CONSTRUCTION:	ca. 1750 (origins: 11th Century)
	AUTHOR/DESIGNER:	unknown
	ORIGINAL USE/FUNTION:	hunter's cottage
	ACTUAL USE/FUNCTION:	multi-cultural centre
	CONSERVATION STATUS:	restored (June 2014)
LOCATION	*NATION:*	Slovenija (SLO)
	MUNICIPALITY:	Brda
	CITY/TOWN/LOCALITY:	Vipolže
	ZIP CODE:	5212
	ADDRESS & CIVIC No°:	Vipolže, 29
	COORDINATES:	387061,7; 93007,0 (y; x)
	ALTITUDE MSL [m]	106,4
	CLIMATIC ZONE [DD]:	\
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	2287 - VIPOLŽE
	CADASTRAL MAP/SUBJECT No°:	211 (house)
	PARCEL/CAD. UNIT:	529; 530; 531; 532/1
NUMERICAL DATA - site	*LOT AREA [m^2]:*	6469
	COVERED AREA [m^2]:	810
	UNCOVERED AREA [m^2]:	5659
	BUILT AREA [m^2]:	3907,59
NUMERICAL DATA - building	*No° OF STOREYS ABOVE GROUND:*	3
	No° OF STOREYS UNDERGROUND:	1
	TOTAL STOREY No°:	4
	PLANT AREA [m^2]:	905,88
	AVERAGE HEIGHT [m]	15
	TOTAL NET AREA [m^2]:	2102,71
	TOTAL VOLUME [m^3]:	13588,20
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	B - special zone
	SPECIFICATIONS:	VIP-BT 1
	NOTES:	touristic purpose
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	yes; cultural heritage
	REGULATORY REFERENCE:	Ur.l. RS, št. 81/99-3867, 55/2002-2687
	FROM DATE/YEAR:	2002
	OTHER RESTRICTIONS:	NO
NOTES:	*OTHER INFORMATION:*	value: 75.245,75 Eur (before renovation)

Figure 51: Vila Vipolže: Building ID Part 1

BRIEF HISTORY			Vila Vipolže
PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS
11th Century	hunter's cottage and stables	count family from Gorizia (Ita)	\
Middle Ages - 16th Century	representative villa	families Herberstein (1311), Della Torre (1460)	around 1510 was already in poor conservation status and was some time later therefore totally rebuilt by Thurn (della Torre) family
16th - 20th Century	summer villa	Venetian Republic; noble family Attems (XVIII), Teuffenbach (1912)	1st half of the 16th Century: renovation in Venetian Villas' style after it had been partially damaged; end of 17th Century (before or after fire) was renovated again
WWI	military hospital	\	partially destroyed by a bomb
1948	\	\	hit by fire
50s	\	\	roof reconstruction; ring beam added
post-war period	occasional dance-floor	\	external area is temporarily converted into a dancefloor in summertime; basement is also used by local cultural associations and groups
June 2014	\	Republic of Slovenia	restoration; beginning of 2015 will open a multi-cultural centre

CONTEXT QUALITY		
LANDSCAPE QUALITY/FRAME	*urban context*	to the North: small town of Vipolže formed by traditional isolated 2/3-storey houses, plastered walls, 2 or more roof slopes covered with roof tiles
	natural context	situated on a hill among vineyards has a great view of the rural surroundings
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	historical situation: in front of the building there used to be a meadow and later a garden with a baroque water well, behind an orchard; currently: surrounded by vineyards and trees - there are some centuries-old cypresses that are among the oldest in Slovenia; the entrance is abandoned
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	touristic and agriculture: fine wine-production
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	B&B, agritourism
ACCESSIBILITY	*main infrastructural connections, transport facilities*	local road

SOCIAL VALUE		
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	...
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	strategical base in Middle Age, residence of main noble families from this region (business centre of the feudal system), evidence of Venetian influence
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use*	in the last decades the building and its site have been used for traditional dancing performances and meetings by local people and associations
SPIRITUAL VALUE	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*	\

ARCHITECTURAL QUALITY		Vila Vipolže
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	The exterior seems closed and massive, there is a Venetian compartment of the facade by means of paired windows interrupted by chimneys. Only their pyramidal crowning element give a sense of verticality to the building. Groundfloor windows are protected with iron grating, whereas the ones in the attic are little squares, according to Friulian tradition. There is a central little stair leading to a stone portal, replicated in the piano nobile with a baroque pediment interrupted by a vase.
	decorative elements (exterior and interior)	classic window/door stone-framing, pyramidal chimneys with sphere, moulding, tower quoin, balcony and balustrade
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	Friulian villa with late-Renessaince and Venetian Villa influence; type: castle-villa
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	is the only Renessaince villa in the countryside in the region of Nova Gorica
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	\
TYPEICAL/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	The building is an example of a castle-villa: it is a countryside representative residence of a noble family as well as a defence fort; its plan has a rectangular form with two lower rhomboidal towers that have been added to the sides. The facade follows late-Renessaince compartment with the central axe marked by an entrance portal of stone and a collapsed balustrated balcony at the piano nobile. This can be accessed by means of a two-flighted vaulted stair at each ending, whereas the atrium has a square plant covered with an umbrella vault. The first floor has a central chamber and other rooms served by a long corridor. The cellar is a single big vaulted room connected to upper floors and directly to the outside.
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	The building construction materials and systems are traditional, no innovative aspect can be observed. It has stone-masonry walls, finished with plaster (almost absent externally) and whitewash (inside). Wooden floors and roof structure covered with roof tiles. In some cases floorings are mixed or have been replaced - wood, tiles, asphalt.

PRESERVATION DIRECTIVE	
Summarise directive and restrictions from the authority in charge for the preservation of the subject.	Building external appearance must be mantained: all decorative elements must be preserved as well as the roof and its inclination. Damaged and irrecoverable elements must be reproduced in accordance to existing models. Infilled windows should not be re-opened. The balustrade on the balcony must be rebuilt similarly to the one of Rabatta Palace in Gorizia. Inside: stone-portals, vaults and plant grid must be preserved; ground floor: the aisle must be re-created; first floor: central room must be re-built with missing walls. Flooring from ground floor must be mantained; the one on the staircase must be re-established according to existing model; first floor: asphalt must be removed and replaced with approved flooring; underground: asphalt removed and replaced according to new function. Staircase: vaults must be rebuilt; right tower: floor reconstruction; first floor: beam-ceiling reconstruction. Preliminary investigation must be carried out (material composition, mortars etc.)

BUILDING ID (PART 2) — Vila Vipolže

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	GROUP ELEMENTS	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS (before renovation)
A SUBSTRUCTURE	A01 Foundations	stone foundations in flysch sandstone and part in limestone	flysch sandstone limestone	\
	A02 Slab on Grade			
	A03 Basement walls	massive stone masonry wide from 70 to 130 cm with good quality mortar	flysch sandstone lime mortar	basement walls are very humid due to rainwater drainage in proximity of external basement walls
B SUPERSTRUCTURE (load-bearing)	B01 Frame			
	B02 External Walls	stone masonry and lime mortar, widths: BASEMENT: central building 170-175 cm; east tower 150 cm; west tower 120 cm; GROUND FLOOR: central b. north 144, south 93-113 cm, lateral 135 cm; east tower 120-135; west tower 120 cm; FIRST FLOOR: central b.: north 115 cm, south 93-113 cm, lateral 110 cm; east tower: 80-120 cm; west tower: 97; MEZZANINE: central b.: north 92 cm, south 93-113 cm, lateral 85 cm.	flysch sandstone lime mortar	lower part of walls are solid and well constructed with bigger blocks, no gaps in mortar were found; whereas in higher levels some walls are partially filled with bricks, frequent gaps in mortar; external surfaces are exposed to atmospheric agents due to lack of plaster layer
	B03 Internal Walls	stone masonry and lime mortar, widths: BASEMENT: 170-175 cm; GROUND FLOOR: 135 cm (central b.-towers), 107-110 cm (corridor-hall), 70-74 cm (between rooms), 46 cm (corridor); FIRST FLOOR: 110-116 cm (central b.-towers), 80-100 cm (corridor-rooms), 62-65 cm (between rooms), 46 cm (corridor); MEZZANINE: 65 cm (corridor-room).	flysch sandstone lime mortar	two transverse walls on the first floor have been demolished
	B04 Upper floors	above basement level there is a stone vault (flysch sandstone blocks) supported by longitudinal walls (no horizontal tie bar)	flysch sandstone	good
		above ground floor there are various brick vaults (umbrella, groin, dome)	clay brick mortar	no major cracks or subsidence; vaults above southern corridors and stairs are in poor condition (subsidence/collapse); floor above first level is missing
	B05 Roof	dual- (or more) pitched roof, wooden roof truss	timber ?	in good status, ring beam was added in the 50s
	B07 External stairs	S-E stairs in RC	concrete steel	original stone stairs have been replaced
	B08 Internal stairs	stone stairs	limestone	good
	B09 Projections	balcony	\	collapsed

Figure 52: Vila Vipolže: Building ID Part 2

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION Vila Vipolže

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
C PARTITION & CLOSURE	*C01 Interior partitions*	bricks and mortar, widths: GROUND FLOOR: 12-13 cm (corridor), 15 cm (east tower); FIRST FLOOR: 18 cm (east tower).	clay brick mortar	most of these are infill walls, whereas others are new partitions in the southern corridor
	C02 Internal doors	doors are generally wide 103-124 cm and high ca. 205 cm	\	4/25 are filled in (all on groundfloor)
	C03 External doors	doors are generally single or double-fleated wide 120-172 cm and high about 330 cm	wood	1/9 is filled in; at least 4 are totally missing
	C04 Windows	wooden frame	wood glass; (bricks)	many windows have been filled in with brickwalls
D FINISHES	*D01 External wall finishes*	external plaster	\	is almost entirely missing
	D02 Internal wall finishes	internal plaster	lime plaster	generally good
	D03 Stair finishes			
	D04 Floor finishes	brick or stone floorings are original, in some rooms have been replaced with asphalt or finished with concrete	brick limestone asphalt; concrete	almost half of original floorings have been replaced with asphalt or concrete
	D05 Ceiling finishes			
	D06 Roof finishes	roof tiles	clay mortar	recently restored
	D07 Doorstep	stone blocks	limestone	good
E DECORATIVE ELEMENTS	*E01 External wall decoration*	tower quoin of stone blocks	limestone	good
	E02 Internal wall decoration	wall paintings in the last level, northern side	n.d.	mediocre
	E03 External window & door framing	stone blocks	limestone	some are damaged
	E04 Internal window & door framing	stone blocks	limestone	\
	E05 Roof decoration	pyramidal stone chimneys with spherical crowning element	limestone ?	3/4; one collapsed, 2/3 spheres are missing; elements are not properly anchored
		under-roof moulding	limestone Repen	limited portions are damaged
	E06 Balustrade and parapets	balcony parapet	\	missing
	E07 Other			

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	rainwater is directly dispersed into the ground near basement walls	\	see: A03
	F02 Plumbing	sanitary waste management is unknown	\	\
	F03 Heating	fireplaces have been removed	\	removed
	F04 Ventilation & A/C	\	\	\
	F05 Electrical installations	wiring is visible on external facades	\	obsolete
	F06 Gas installation	\	\	\
	F07 Communication installation	\	\	\
	F08 Lifts & Escalators	\	\	\
	F09 Fire protection	\	\	\
		OMISSIS		
	F10 Protective installation	\	\	\
G SITE EQUIPMENT	*G01 Site enclosure*	\	\	\
	G02 Site paving (hard landscaping)	\	\	\
	G03 Soft landscaping	\	\	\
	G04 Site services (public utilities)	electricity, water	\	\
	G05 Site buildings	two private houses adjacent to the building to the South	\	\
	G06 Site fittings			

Vocationality Analysis

Table 34: Vila Vipolže: Vocationality Analysis

PARAMETER GROUP	RES	PRO	ACC	C&A	PUB	min
CONTEXT QUALITY (territory)	0,654	0,376	0,654	0,466	0,527	0,457
ECONOMIC CONTEXT (area)	0,797	0,481	0,974	0,856	0,721	0,601
B&S QUALITY	0,573	0,478	0,572	0,430	0,572	0,454
B&S VERSATILITY	0,460	0,415	0,492	0,460	0,460	0,415
POTENTIALITY	0,545	0,271	0,572	0,458	0,441	0,356
COMPATIBILITY	0,385	0,310	0,392	0,294	0,376	0,302
VOCATIONALITY	0,599	0,429	0,660	0,572	0,557	0,493

Similar results, which can be grouped together, are underlined, whereas red scores should be excluded due to particularly low scoring.

Despite the few facilities available in Vipolže, the amazing wine production area with its panoramic views on vineyards and the presence of bicycle tracks make the villa particularly suitable for residential or accommodation purposes, and in second place for public of c&a activities. The touristic area privileges accommodation too, followed by c&a, public and residence, in any case leaving out production[132].

B&s quality remark the possibilities of turning the property into residential, accommodation or public functions, yet preferring production to c&a due to the availability of open area, which is not fundamental for administrative and commercial purposes. Nevertheless, production is closer to the minimum threshold than to the first set of alternatives, so that it could also be considered inappropriate.

The building shows a discrete level of adaptability: what is still left should be preserved, but the type offers many design solutions; by contrast, external area can be rearranged though not modifying the built asset and preserving the old cypresses. Such conditions seem mostly compatible with accommodation and next residential, accommodation or public functions.

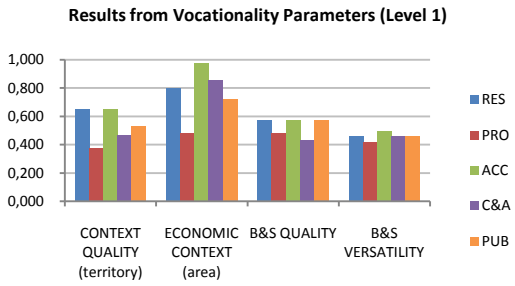


Figure 53: Vila Vipolže: Chart with Vocationality Results 1

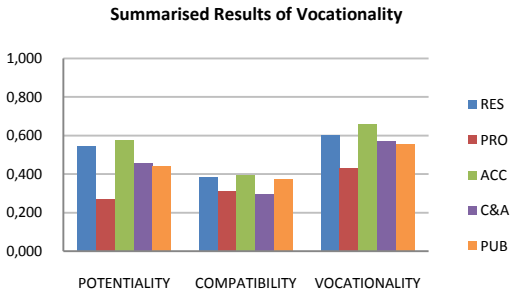


Figure 54: Vila Vipolže: Chart with Vocationality Results 2

Grouped parameters as well as the final vocationality results agree on the suitability for accommodation or residential use; potentiality and vocationality are also harmonious on placing c&a third, followed by public and excluding production, while compatibility accepts public and production, dismissing c&a[133].

Currently, the villa is a cultural centre with exhibition areas on ground floor, a hall for public meetings on 1st floor and some apartments in the attic. The basement is rented to a private restaurateur by the Institute for Tourism, Culture, Youth and Sport of the Municipality of Brda, which is the main property manager.

[132] Generally meant as small factories, artisan production, distribution and logistic activities or shopping centres – so not directly referring to wine production, although it would perfectly suit the area.
[133] For further information on vocationality analysis see the attached evaluation model of vila Vipolže (A_VII.5).

Sustainability Analysis

Table 35: Vila Vipolže: Sustainability Analysis

SUSTAINABILITY AREA	RESULT (0-1)	No. DON'T KNOWS	No. NOT PRESENTS	ANSWERS PROVIDED	TOTAL ANSWERS	COMPLETION %
GENERAL SUSTAINABILITY	**0,734**	**10**	**3**	**64**	**71**	**90,14%**
SOCIO-CULTURAL S.	0,716	3	0	31	34	91,18%
ENVIRONMENTAL S.	0,709	6	2	22	25	88,00%
ECONOMIC S.	0,777	1	1	4	4	100,00%

The final project for vila Vipolže achieved a good and well-balanced sustainability level, for all macro-categories have similar outputs.

Economic sustainability is in this case the best performing, with minor risk and the co-financing of operating cost – these are in part covered with public funds and in part with the rental of the restaurant space,[134] whereas the renovation was financed (in part) with European funds for regional development.

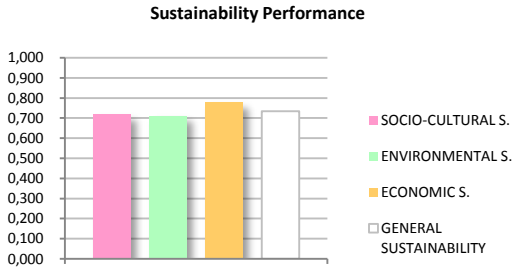


Figure 55: Vila Vipolže: Chart with Sustainability Results

User comfort and perception are excellent, the process quality is also good, even if some parameters still need to be evaluated (e.g.: public participation, construction quality assurance and EMS documentation). Slightly worse is the cultural heritage part, where operations on technical systems and finishing & decorative elements were quite invasive, materials are mostly compatible except for structures, while not all interventions are reversible; the building was in bad condition, with several collapsed floors, boarded-up windows and missing finishes or decorative elements. The project decided to rebuild the construction as it used to be, integrating missing parts and completing structures by increasing robustness. Despite the project intentions, many finishes were substituted. In general, structural additions/modifications are recognisable, whereas decorative integrations are less visible.

The environmental sustainability part is the one with more gaps, that nor the available project material, the building occupiers or the personal visit could clarify; these are: thermal insulation, material certification and construction site management. Weaknesses are generally in common with the previous examples: no renewable resources or rational use of water supplies were thought, while permeable surfaces were partially reduced; by contrast, the project adopted efficient technology to limit pollution and rearranged the open area maintaining the existing vegetation and offering sufficient parking, bicycle facilities and outdoor furniture[135].

[134] In the future, also the small apartments in the attic will be available for rent.
[135] For further information on sustainability analysis see the attached evaluation model of vila Vipolže (A_VII.5).

5 DISCUSSION & CONCLUSIONS

In this final part the performance of the method on the above examples is discussed and some observations are made to the vocationality analysis first and to the sustainability analysis in the second place. Finally, some general conclusions on the whole research can be found in chapter 5.2.

5.1 COMMENT ON THE PERFORMANCE OF THE METHOD

The case studies that have just been presented are the final result of continuous testing and refining of the new method that was grounded on the Villas model from 2006. This specific tool was selected among 18 other building sustainability assessment methods (BSAM) due to its systematic approach to the complex task of re-using and preserving historic assets in a sustainable way. Moreover, no other BSAM is considering the phase when a new compatible use should be defined, except for the Villas Vocationality tool. However, the Villas model deals with a homogeneous group of constructions – the Venetian villas – and provides a very specific list of sustainability parameters.

In order to be applied to various building types in the trans-border territory of Nova Gorica and Gorizia, the Villas model was largely adapted and improved, leading to a completely new method, which also includes an initial analysis of the building and its site, namely the knowing phase. The adaptation mainly consisted in redefining the tree structure of the parameters for a wider application[136] and in modifying the evaluation method in order to suit the large number of criteria. On the other hand, the Villas model was improved with new parameters derived from the literature review and the analysis of BSAMs and by introducing the possibility of tailoring the sustainability model by excluding or including certain criteria, which also solves the situations of indeterminateness that are particularly frequent at early planning stages. In addition to this, over a hundred participants contributed to the definition of the two model weights, including experts from different fields: architects/engineers, urban planners, ecologists/landscape architects, economists, public administrators, real estate investors and city dwellers from both Italy and Slovenia.

The method was applied to six different projects from the territory of Nova Gorica and Gorizia, in order to test its efficacy in reference to different building types, period and socio-economic context as well as to three different planning stages: preliminary, intermediate and final project. As mentioned before, the tests were repeated several times as the two evaluation models (the vocationality and the sustainability analysis) were continuously improved by modifying the normalisation and aggregation of results[137] on one hand and providing a better organisation and definition of the parameters on the other.

With regard to the vocationality analysis, the different examination of results offers the possibility to evaluate the situation from different perspectives: the final vocationality summary produces only one of the possible ranking, that though considers all parameters; more interesting is the comparison of such results with the "potentiality" output, that provides a preference list according to the context situation, which is often the point of view of urban planners and local administration; on the other hand, the "compatibility" group focuses on the building and site possibilities, which are indeed the reference point of conservator-restorers and of the authorities for heritage preservation. In order to fully understand the rankings so obtained, a further interpretation of partial results is recommended: the four main parameters – context quality, economic context, b&s quality and b&s versatility – can indeed help to explain contrasting or unexpected results.

In general, it was observed that residential often (3/5 case studies) comes first in the general vocationality ranking, which is a direct consequence of the positive effect that most features have on this use. In fact, the

[136] The new vocationality model provides five different groups of uses (residential, production, accommodation, commercial & administrative, public) instead of the three proposed by Villas (residential, accommodation, administrative) and the list of parameters was completely revised and enriched with other features that better describe the reference territory. On the other hand, the list of criteria considered by Villas sustainability model was specifically thought for Venetian villas and was also lacking parameters regarding social and environmental sustainability.

[137] Despite the changes, the final system of normalised weights fully respects the preferences expressed by the questionnaire participants.

highest weight was frequently assigned to the residential purpose[138], becoming a reference maximum for the normalisation of other weights. Moreover, examining the context quality, great emphasis was put on ecological-environmental quality and facilities proximity – both very important for residential use – so that the other parameters cannot alter the final order of preferences but can mainly vary the difference between the scores. However, a preference for residential purposes is an acceptable result in relation to the real-estate market, where such assets – especially with regard to the territory of Gorizia and Nova Gorica – have greater chance of being sold/rented than the other uses that are considered in the vocationality analysis.

On the other hand, economic zone is certainly of key importance in the general ranking of uses: the type of zone often determines the vocational summary by favouring homogeneous solutions (residence in residential area, etc.), which was almost unanimously assessed by the questionnaire participants; on the other hand, visibility is decisive for accommodation and c&a.

The quality of the building is again attractive for residential use, although without special features (balconies, views, etc.) the preference would go to public purposes. The model testing has also proved that site availability and quality are crucial factors for residence, whereas generally have a "negative" impact on c&a, which, according to the survey, is less likely to need external areas[139], hence is outdone by other uses. By contrast, generous indoor height and floor load are preferable for public purposes.

According to the values obtained in the questionnaires, the model was designed to consider how the different uses are capable of accepting limitations that may affect the building and site modifiability: in case of total versatility of both (b&s) the ranking would be: production, residential, public, c&a; in case of scarce building versatility public, residence and accommodation would be more likely to accept compromises, while site non-versatility is mostly tolerated by accommodation, public and residential purposes.

In conclusion, the vocationality model does not provide definitive answers, but it can actually produce also contrasting results in reference to the different grouping possibilities (final vocationality, potentiality, compatibility). Interpretation of such results is here fundamental to understand if the outputs are admissible or the model was unable to grasp the particularity of the case under examination, as in the case of the ex-O.P.P. Anyway, the aim of this step is to help the DM to discuss the problem at different levels and from different points of view, considering both relations with the context as well as the asset's character, in order to consciously form an idea of the most suitable choice/s for the building revitalisation. However, it often happens that the new use is defined privileging stakeholders' intentions. The present vocationality model does not consider personal wishes, but it is rather based on objective conditions and situations that may affect the success of a certain building use/function. Finally, the model could be used to explain and discuss the choice of a new use with stakeholders (confirming or contrasting with their opinion).

On the other hand, the sustainability analysis offers an almost immediate interpretation of the project sustainability performance through its final summary indicator and the partial output of the three concurring macro-categories: all results, at each node of the sustainability tree, are expressed on a 0-1 scale (1 as maximum), which also makes the weak points of the project quickly visible.

Since the sustainability model must fit all the different project phases with a different number of pending parameters, obtained results are not equally reliable, therefore the model automatically calculates – for the whole analysis and the three sustainability areas – the completion %, which is directly proportional to the reliability of obtained results. As a consequence, the model's completion should increase along with the project definition and should be fully completed by the time of realisation. Nevertheless, the two *ex post* applications

[138] Questionnaire participants are living in Gorizia or Nova Gorica and, unavoidably, their answers were given as city dwellers in first place (and next as professionals) and were, therefore, influenced by personal wishes and imagination on their ideal home.
[139] The model, as a consequence of the assigned weights, does not consider external area as parking, or better: open area is certainly superfluous for c&a if shops and offices in the city centre of Gorizia or Nova Gorica that are already provided with public parking are considered.

do not reach 100%, because certain aspects – as for instance control during execution or other project details – were not inferable from available materials.

Of course, the sustainability analysis is more useful at early planning stages than at later or final project phases, when most decisions had already been taken. However, the evaluation obtained for preliminary project is usually scarcely reliable, since it contains many gaps ("don't knows"). Despite this, the model is able to provide an assessment of the sustainability performance, which could be good (closer to 1), mediocre (approx. 0,5) or bad (closer to 0): if the output is good, the user (designer or DM) should try to fill the gaps; if the result is mediocre, he should work on both the missing criteria and on improving the already defined interventions, while in case the result is bad he should revise most of the project or think about a different solution.

However, the application on the six case studies proved that the final sustainability indicator is less important than the three partial evaluations of the macro-categories, for the model is able to provide an above threshold output for sustainability even if the minimum (0,500) was not achieved in all three domains. On the contrary, many case studies performed badly in the economic part although most answers were not provided: in fact, the model does not neutralise parameters from the category level (most economic criteria are defined on this level) and missing answers are automatically assigned the lowest value (0,000). As a consequence, if the user is not able to answer this part, the economic sustainability will be proximate to 0. This feature indeed allows to respect Elkington's triple bottom line approach, according to which the whole project cannot be considered truly sustainable unless a certain level of sustainability is guaranteed in all three sustainability areas. Moreover, in the early planning phases the sustainability analysis could provide higher results than in the later project stages if the definable criteria record a good performance, for the omitted criteria ("don't knows") are over-estimated due to their weight redistribution among the known parameters. Vice versa, the preliminary performance could be lower than the final one if the initial interventions receive a low assessment.

Examining the case studies outputs, the best results were often achieved in the socio-cultural area. This macro-category is certainly the most influencing (higher weight), but it also contains many aspects that can be determined from the very start (community engagement & values, public use & benefit) or are usually guaranteed by projects (user comfort & perception). The most difficult is indeed "cultural heritage", where the almost mandatory "safety & regulatory compliance" often conflicts with the solutions' invasivity, reversibility and material compatibility. However, the penalised contribution of the latter three results is somehow balanced by the greater weight of the first aspect (safety & regulatory compliance).

Recognisability, as a principle of respecting the building authenticity, is an important factor in Italy's restoration traditions, but is less common in other countries, where the patina of time is often removed. However, this parameter is almost uninfluential in the evaluation of socio-cultural sustainability due to the weight derived from the average opinion of the experts (Italians, Slovenians, and from other countries), who assigned little importance to this criterion.

In addition to this, case studies proved again that re-use projects can barely reduce the demand of primary energy: none of the considered examples takes advantage of renewable resources, while thermal insulation is often very limited due to the historic character of the building. Similarly, ecological impact is also problematic, because projects seldom think about the management of the construction site and the material eco-compatibility. Anyway, the overall performance in the environmental sustainability is often compensated by the improvement of external areas and the provision of transport facilities (parking, bicycle facilities, etc.).

Finally, the sustainability model was so far able to predict if the project would be successfully completed or not. In fact, only the two finished projects – the ex-O.P.P. and the vila Vipolže – obtained a positive output in all the sustainability areas. Vila Laščak was economically not sustainable in both the preliminary project (2014) and the intermediate level (earlier project from 2007); the first proposal was in indeed abandoned due to unfinanceability and the second one has been suspended, probably for the same reason. On the contrary, the application on the feasibility study for villa Louise revealed an insufficient performance only in the environmental sustainability domain, where most answers were not provided yet; the project is currently

under development and will be probably successfully completed, although its sustainability level could change (either for the better or the worse) depending on the project solutions that will be defined henceforth. At last, an exception can be found in the case of the Gradisca Castle, where the model provided below-threshold results for both the economic and the environmental sustainability although the project is still going on and will be predictably carried out. Such incongruity derives from the project's peculiarity, for the proposal by Bonanno and Vianello aims at refurbish the solely open area and not the buildings due to insufficient economic funds. However, the application considered also the re-use project developed by Monorchio, which would actually not be economically feasible, while the environmental performance is still not defined enough and, therefore, leads to an unsatisfactory result.

5.2 CONCLUSIONS

The literature research that was presented at the beginning of the present work has demonstrated that sustainability is nowadays a common topic, in rapid and continuous progress. Its definition has already broadened from the mere ecological issue to include also socio-cultural and economic matters, raising the problem to a higher level. The same can be said in reference to the regulation framework, even though more precise indications can be found only for environmental sustainability. Nevertheless, both international and national acts are giving priority to re-use before new construction as a key strategy for a future sustainable development.

According to the generally accepted "triple bottom line" approach, sustainability is achieved only if a minimum success is guaranteed in all three domains. Current building sustainability assessment tools around the world are trying to accomplish this integrated goal, by updating their models with missing components. However, an analysis of such tools showed that most of them are not yet properly considering all the three forms of sustainability. On the other hand, the majority is launching new profiles, able to deal with renovation or refurbishment actions or buildings' management, in addition to the main application on new construction. Nevertheless, it was observed that most of these new components are still inadequate for the sustainable re-use of heritage assets. The only two exceptions are the GBC HB protocol and the Villas method that were indeed the starting point for the development of the new method.

The aim of the present study was to provide a method for the sustainable re-use and preservation of existing buildings and sites with particular regard to the area of Gorizia and Nova Gorica. The research topic is therefore related to the spatial problems of ground consumption and optimisation of available building stock. As a matter of fact, the new method promotes a rational management of infrastructure through the re-use of existing assets and, as a consequence, it preserves non-built-up areas by avoiding new construction.

The main novelty of this research is represented by the broad approach to the task of sustainable preservation:

- the project development is supported from the informational phase on, where the asset is appreciated also for non-conventional qualities;
- the consideration of the vocationality phase as a key-element for a successful sustainable intervention was so far proposed only by the Villas model (however, in relation to the specific target of Venetian villas); this step links sustainable re-use to an urban and territorial scale too, by considering spatial features beyond the borders – a point of view that has often been neglected in the urban planning within the reference area;
- the holistic approach to sustainability focuses here on the preservation activity of built heritage (in a larger meaning), while almost all available BSAMs provide other application protocols;
- sustainable preservation starts with the DMs' awareness of the problem complexity and with a mindful control of choices that are indeed promoted by the new method.

Since the method was developed (and later tested) considering currently abandoned or mis-used buildings of public property, its end-user would mostly (but not exclusively) be public administration, which nowadays deals with a considerable amount of abandoned buildings and limited financial resources. Nevertheless, the method also enables the participation of different stakeholders to the decision-making process, who might be competent actors or non-experts. However, public administration is the main subject who should promote sustainability on a larger scale, guaranteeing well-being of people through the satisfaction of public needs and the design of high-quality spaces that are not only ecological (environmental friendly, energy efficient) but also pleasant (comfortable, usable/accessible, safe) and valuable for contributing to public benefit, economic growth and cultural identity.

Therefore, the method should deal with assets that are not necessarily listed, but could differ in context, construction period, type, etc. Its main objective is to accompany the designers and the decision-makers through the whole design process. Contrary to the tools mentioned above, the new method is composed of three main steps: the knowing phase, the vocationality analysis (choice of a new use) and the sustainability analysis (planning of a sustainable intervention). The first one upgrades the ID card proposed by the GBC HB protocol, while the latter two phases were derived by the Villas model, which was adapted to meet the wider variety of assets and the specific character of the reference territory; moreover, it was enriched with the positive features of other building sustainability assessment methods (BSAMs) – as for instance BREEAM, SBTool, LEED, DGNB – that were included in the comparative analysis of 18 international/local tools.

The last two phases were also provided with an evaluation model whose aim is to offer an “objective” support to complex problems. The evaluation approach is similar to the Villas’, which is a particular multi-criteria decision method (MCDM) derived from the multi-attribute value theory (MAVT), where the aggregation algorithm has the great advantage of considering also interactions among criteria thanks to the adoption of non-additive measures. Such weights were collected through a survey that involved over a hundred experts from different countries and various fields. The vocationality part involved local decision-makers (public administrators, real-estate investors), designers (urban planners, landscape architects, architects) and city dwellers. On the other hand, the sustainability part gathered the opinion of international experts (Italians, Slovenians, Croatians and from other European countries), who were mostly designers: architects and conservators, engineers, urbanists, landscape architects, but also economists and sociologists. Their judgements were in both cases, for the vocationality part as well as for sustainability, rather equally distributed among the available parameters, although in the sustainability model the socio-cultural components is slightly more important than the environmental and the economic.

The first step of the method, the knowing phase, is meant to raise the user’s awareness of the subject to re-use by developing an idea of the weak and strong points that should be considered in the successive project definition. The user is here asked to carry out a series of analyses – historical research, photographic and social survey, analysis of the economic context and of the construction as well as of its conservation status – whose information are systematically organised in a sort of identity card. The ID opens with a general information table, followed by a brief history and the building appreciation of values and limitations, such as the context quality, the social value, the architectural quality and the preservation directives. The content of the last part was determined through an analysis of the evaluation criteria for modern heritage (Docomomo Fiche, the Burra Charter and other documents), which was selected because it deals with various types and therefore offers a more comprehensive list of parameters and values (not only aesthetic or historic). In the second part of the ID there is an elemental classification of the construction, where material specifications, quantification and diagnosis offer a more technical knowledge of the asset.

The following vocationality and sustainability analyses aim at defining the most suitable new use for the considered building and its site and at controlling the sustainability level of the design choices in reference to all the three sustainability domains. Each of the two evaluation models is applied to a hierarchical structure of parameters, namely the vocationality and the sustainability tree. Their criteria were defined through a literature review and the comparative analysis of similar tools and were later enhanced thanks to the continuous application on some case studies.

In particular, the vocationality analysis considers both the character of the environment from the territorial to the neighbourhood scale and the features of the building and site (architectural scale). On the basis of these and of the system of weights derived from the aforementioned survey, the model ranks (from the most to the least suitable) the five groups of uses: residential, production, accommodation, commercial & administrative and public. However, the user should base his choice not only on the final vocationality ranking, but should ponder also on the partial results provided: the "potentiality" group refers to the context situation and is presumably in accordance with urbanists' priorities, while the "compatibility" focuses on the building and site characteristics, which are more important to conservators. The approach could seem complicated, but it gives the opportunity to consider various and often conflicting points of view, leaving the user free to decide on a rational basis.

On the other hand, the sustainability analysis was designed to accompany the user from the preliminary up to the final planning as an on-going evaluation. In order to solve the indeterminate situations that characterise the early planning stages, the model has the opportunity of excluding certain criteria that have not been defined yet by choosing the "don't know" answer. This makes the model also more flexible and customisable to fit various circumstances. Anyway, this analysis is not meant to certify the project sustainability performance, but rather to highlight its weak points (low scoring) or the undefined aspects (project gaps marked by the "don't know" option), so that the user can improve them. Thanks to the normalisation of scores – which are always included between 0 and 1 with the first representing the worst and the latter the best performance – it is rather easy to understand and compare the model outputs. However, since some parameters are in contrast, the maximum score is ideal and the user should set his or her own goals according to his/her or other decision-makers' (stakeholder) priorities.

Both evaluation models (vocationality and sustainability) leave the user freedom of choice and support him or her in the understanding and the reasoning of the planning task. Furthermore, they can also be used as a means of communication and negotiations by quickly identifying strengths and weaknesses of the alternative solutions, due to a clear visualisation of partial and final results. Thanks to a rather easy approach and the user manual (chapter 3.4), where each step is well described, the method could be used autonomously with no previous preparation. Nevertheless, an introductory course for users could guarantee a more effective and conscious use.

The method was finally applied to six different case studies, chosen in equal number from the territory of Gorizia and Nova Gorica, and that cover all the three project phases. In order to test the efficacy and versatility of the method, their selection was made in order to guarantee as much variety as possible – different type, age, location; nonetheless, the choice was much influenced by the poor availability of projects for the reference area.

Thanks to the continuous testing of the method in the case studies it was possible to refine the models and to provide them with some special features, as for instance the diverse interpretation/points of view in the vocationality part or the sustainability model tailorability with the possibility of applying the evaluation at different planning stages. The testing demonstrated the general method's efficacy, though providing sometimes discordant outputs – especially in the vocationality case: this suggests that the method is definitely not deterministic and is not meant to provide definite answers and solutions, nor certification, but rather to support the decision-maker, when several aspects should be considered together in reference to the requirements and opportunities of the subject. Therefore, the most important part of the method is probably the interpretation of results, when the user is asked to view the task from different perspectives and by doing so, he is more likely to make rational decisions due to increased situation awareness. On the other hand, the trial of the sustainability analysis showed that the model is able to point out the weaknesses of a project, on which might depend its successful completion.

However, the practical application of the method revealed some weak points too, as for instance in the ex O.P.P. case, where the vocationality model was unable to perfectly describe the particular situation of the asset. Anyway, since the method should be applicable to different uses and building/area types, its parameters

could not be specified further. Similarly, the sustainability analysis is prevalently based on the user's subjective opinion, although the parameters were defined as accurately as possible in order to limit personal interpretability. Even so, a more objective assessment would require complex calculation, as in the BREEAM example, and would also reduce the usability of the tool. On the contrary, the model might already seem to have too many criteria; nevertheless, a simplification could narrow too much the problem of sustainability interpretation, potentially leading to a copy of existing tools.

In conclusion, the proposed method can certainly be improved and also adjusted in order to be applied elsewhere: either to different geographical regions or specific building types. It is currently configured according to the territory of Gorizia and Nova Gorica, but it could fit other situations by reviewing the list of parameters and by redefining the weighting system, possibly including a greater sample of experts. In particular, a model exportation would request greater changes in the vocationality part, where the parameter selection and description were set to fit the study area. Moreover, any variation in the organisation of parameters would require a review of related weights. On the contrary, the sustainability analysis is more likely to adjust to different situations with minor or no changes at all, for its criteria derive from international and generally accepted tools. In this case, modifications are rather expected in the importance (weight) assigned to a certain issue, which could vary due to a different cultural background: this could in fact bring to a different sensitivity on sustainability matter and prioritisation of goals.

In addition to model exportation, future research could focus on a vertical integration of the method, which is currently dealing with sustainable preservation mainly on an architectural scale. Therefore, further research could investigate how the method could be upgraded into a multi-scale planning approach, which should verify and control the sustainability level of an action on both the urban scale and in detail.

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APPENDIX: ATTACHMENTS

ATTACHMENT I – BSAM CARDS

1 | BSAM Cards

BREEAM®

GENERAL INFORMATION

STATE DEVELOPER:	UK
DEVELOPER:	BRE
RESEARCH STARTED IN:	1990
LAST UPDATE:	2015
CURRENT/ANALYSED VERSION:	International Non-Domestic Refurbishment and Fit-Out 2015
APPLICATION:	buildings and urban districts from UK or international
AVAILABLE PROFILES/SCHEMES:	• new non-residential buildings in UK (BREEAM New Construction) • new residential or non-residential buildings (BREEAM International New Construction) • sustainable management of existing non-residential buildings (BREEAM In-Use) • housing refurbishment (BREEAM Refurbishment) • masterplanning work and live places (BREEAM Community)
OTHER/FORECOMING MODEL: -	

CRITERIA

NUMBER OF CRITERIA: 47 criteria, checklist with 373 elements
CRITERIA ORGANISATION:
10 assessment sections (management, energy, water, waste, pollution, health and wellbeing, transport, materials, land use and ecology, innovation) subdivided into critieria that can be applied to one or more of the four assessment parts

EVALUATION PROCEDURE AND AGGREGATION MODEL:

each scheme has a modular apporoach with four assessment parts (fabric and structure, core services, local services, interior design); BREEAM adopts a "balanced scorecard" approach, so that the majority of BREEAM credits can be traded, i.e. non-compliance in one area can be offset through compliance in another to achieve the target BREEAM rating. Furthermore, the explicit weighting system is derived from a combination of consensus based weightings, ranking by a panel of experts and where necessary an adaptation process to reflect local conditions in a country (or region).

The user fills the **pre-assessment tool** by selecting the project type, scope of works and by adjusting the scoring and weightings to reflect the categories assessed (**credit applicability**); then the assessor determines for each section the **credits achieved**, which are turned into a **percentage of credits achieved**; these values are multiplied by the corresponding **section weighting** providing an overall section score; **section scores** are **added** together to give the **BREEAM overal score**, which, if compared to the rating **benchmark level** and provided all **minimum standards**, determines the **BREEAM rating** (label).

FINAL OUTPUT AND EVALUATION:

there are six BREEAM classification labels that can be obtained on the basis of the perentage achieved on the total score:

- outstanding (>85%)
- excellent (>70%)
- very good (>55%)
- good (>45%)
- pass (>30%)
- unclassified (<30%)

NOTES:

- credit trade-off: if an assessment element is missing, its weighting is redistributed among the other categories on a proportionate basis;
- local adaptation: weightings are reviewed for the first project that registers for assessment in a country or region;
- minimum standards of performance in key areas are set in reference to a specific BREEAM rating level

REFERENCES:

http://www.breeam.org/RFOInternational2015manual/

CASBEE™ 建築物総合環境性能評価システム
Comprehensive Assessment System for Building Environmental Efficiency

GENERAL INFORMATION

STATE DEVELOPER: Japan
DEVELOPER: JaGBC/JSBC
RESEARCH STARTED IN: 2001
LAST UPDATE: 2014
ANALYSED VERSION: New Construction ed. 2014
APPLICATION: buildings and urban districts from Japan
AVAILABLE PROFILES/SCHEMES:

1) for houses:
- Home (detached) (2007)

3) for urban blocks:
- Urban Development – CASBEE-UD (2014)

4) for cities:
- City (2011, 2012)

other:
- Property Appraisal (2009)
- Brief versions of NC, EB, RN, UD

2) for buildings:
- New Construction – CASBEE-NC (ed. 2003, 2010, 2014)
- Existing buildings – CASBEE-EB (2004) *(only in Japanese)*
- Renovation – CASBEE-RN (2005) *(only in Japanese)*
- CASBEE for Temporary Construction
- CASBEE-HI – for Heat Island Relaxation (for major urban areas like Tokyo and Osaka)
- Local edition (since 2004) e.g. CASBEE-Nagoya (minor city)
- CASBEE for Schools
- Market Promotion (2014)

OTHER/FORECOMING MODEL: some of the tools are available only in Japanese; more are to come in English version

CRITERIA

NUMBER OF CRITERIA: 46 criteria
CRITERIA ORGANISATION:
criteria are organised in two groups – quality Q and load reduction LR – each composed by three categories (Q1 Indoor environment; Q2 Quality of service; Q3 Outdoor environment (on-site); LR1 Energy; LR2 Resources & materials; LR3 Off-site environment). Each assessment item can have one or more sub-criteria.

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The evaluation considers two aspects of a building: its environmental QUALITY (Q) and its environmental LOAD (LR), where load reduction is considered. The sum of these values gives the Built Environment Efficiency (BEE), which is CASBEE's main sustainability indicator.
The user fills the **scoring sheet** where criteria's **Q and LR-values** are assessed on a **scale 1-5** (or 0 = no applicable), with 1 equal to a situation where minimum normative conditions are granted and 3 indicates the ordindary level perceived at the time of assessment (standard performance). Each value is then multiplied by a **weighting coefficient** providing a **result sheet** with a **SQ** (quality score) and **SLR** (load reduction score), that are next synthesised into the **BEE indicator** according to the following formula:

$$BEE = \frac{25 \cdot (\mathrm{SQ} - 1)}{25 \cdot (5 - \mathrm{SLR})}$$

Weightings are determined with an AHP approach.

FINAL OUTPUT AND EVALUATION:

there are five grades based on the BEE value which correspond to 1 to 5 stars (from worst to best):
- Superior (S) (BEE = 3.0 or more and Q = 50 or more)
- Very Good (A) (BEE = 1.5 -3.0; BEE = 3.0 or more and Q < 50)
- Good (B+) (BEE = 1.0 - 1.5)
- Slightly Poor (B-) (BEE = 0.5 - 1.0)
- Poor (C) (BEE < 0.50)

NOTES:
- tailoring criteria: a criterion, if not present, can be removed and its contribution is equally ditributed to other scoring items
- new indicator BEE (Built Environment Efficiency), which is a benefit-loading ratio
- assessment of building complex: the result is a weighted average of the assessment results of each type of building according to ratio of floor areas

REFERENCES:

http://www.ibec.or.jp/CASBEE/english/download.htm

DGNB®
Deutsche Gesellschaft für Nachhaltiges Bauen e.V.
German Sustainable Building Council

GENERAL INFORMATION

STATE DEVELOPER: Germany
DEVELOPER: DGNB and BMVBS
RESEARCH STARTED IN: 2009
LAST UPDATE: 2014
ANALYSED/CURRENT VERSION: CORE 14
APPLICATION: buildings and urban districts from Germany or international
AVAILABLE PROFILES/SCHEMES:

- New Offices
- Existing Offices
- Residential buildings
- Dwellings
- Healthcare
- Educational facilities
- Hotels
- Retail
- Assembly buildings
- Industrial
- Tenant fitout
- New urban districts
- New business districts
- Industrial locations

OTHER/FORECOMING MODEL: Neubau Büro- und Verwaltungsgebäude (2015)

CRITERIA

NUMBER OF CRITERIA: up to 50, generally relating to the entire life cycle of the building
CRITERIA ORGANISATION: 5+1 categories (environmental quality, economic quality, sociocultural and functional quality, technical quality, process quality, site quality) subdivided into critieria with specific indicators

EVALUATION PROCEDURE AND AGGREGATION MODEL:

in reference to the **target values** that are set for each criterion the object can obtain **up to 10 assessment points**; these concur to an overall performance indicator by means of **weights**, which express the importance of a certain criterion; the total score calculated from the five quality sections based on their weightings and is then turned into a **percentage** value; site quality category is considered separately as it is included in the marketability criterion.

FINAL OUTPUT AND EVALUATION:

there are three DGNB certification levels and a "certified" label that can be obtained on the basis of the total performance index (min_{all})

- bronze (min_0 35% and min_{all} 50%)
- silver (min_0 35% and min_{all} 50%)
- gold certificate (min_0 35% and min_{all} 50%)

NOTES:

- option available: simple pre-certification in the planning phase

REFERENCES:

http://www.dgnb.de/de/

ENERBUILD

GENERAL INFORMATION

STATE DEVELOPER:	UE
DEVELOPER:	EU_Alpine Space Program (WP6)
RESEARCH STARTED IN:	2007
LAST UPDATE:	2012
ANALYSED VERSION:	New Construction – public buildings Ed. 2011
APPLICATION:	public buildings from the Alpine region
AVAILABLE PROFILES/SCHEMES:	

- New Construction – Public Buildings

OTHER/FORECOMING MODEL: since 2011 the municipalities of Voralberg have developed new regulation on public subsidies based on the Enerbuild tool; the KGA (Kommunalgebäudeausweis Vorarlberg) developed therefore two evaluation tools/checklists for new constrution and renovation – Neubau, Generalsanierung.

CRITERIA

NUMBER OF CRITERIA: 16
CRITERIA ORGANISATION: criteria are organised into 5 assessment categories (Quality of location and facilities, Process and planning quality, Energy and Utilities, Health and Comfort, Building materials and construction). Each category has a list of mandatory and optional criteria and can set a minimum score to be achieved in reference to a specific criterion.

EVALUATION PROCEDURE AND AGGREGATION MODEL:

Each criterion is evaluated separately and according to the evalaution-tables and descriptions reported in the manual. In general in the Quality of location and facilities can be assigned up to 100 points, whereas the following categories can obtain respectively 200, 350, 250 and 200 point, resulting in a total amount of 1000 points.

FINAL OUTPUT AND EVALUATION:

The final output is a score which can be compared to the maximum affordable of 1000 points. However no specific labels have been yet defined.

NOTES:

Enerbuild is an interregional tool for evaluating the sustainability level of public buildings from the Alpine region. It was developed within a European research programme, where the main objective was harmonise the different certification systems. So far, all the main existing tools from the alpine regions have been compared in order to find a set of common indicators. However, no homoeneous ratings (labels) have been defined yet.

REFERENCES:

http://www.enerbuild.eu/wp/enerbuild-tool
http://www.enerbuild.eu/publications/2011-02_ENERBUILD-result_6-1.pdf

GENERAL INFORMATION

STATE DEVELOPER:	The Netherlands
DEVELOPER:	W/E Consultants
RESEARCH STARTED IN:	1995
LAST UPDATE:	2015
ANALYSED VERSION:	GPR Gebouw
CURRENT VERSION:	NIEUW – GPR Gebouw 4.2
APPLICATION:	buildings and urban districts from Netherlands
AVAILABLE PROFILES/SCHEMES:	• refurbishment of an urban area (GPR Stedenbouw) • special buildings and areas eg. industrial buildings (GPR Specials) • residential and non- residential buildings (GPR Gebouw) – new construction or refurbishment • environment protection (GPR Bouwbesluit) • management and maintenance (GPR Onderhoud)
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 16
CRITERIA ORGANISATION: criteria are organised in 5 key performance indicators (energy, environment (impact), health, quality of use, future value (building quality))

EVALUATION PROCEDURE AND AGGREGATION MODEL:

A multi-criteria analysis is adopted for all categories except for Energy and Materials. For every performance indicator, the building or urban development is generally rated on a scale from 1 to 10. The higher the rating, the higher its sustainability, whereas 6 indicates compliance with normative prescriptions. Sub-indicator scores are aggregated in key indicator scores from 1-10 points, but are not synthesised into an overall score. However, these correspond to a 1-5 star rating.
No further information is disclosed about the aggregation model.

FINAL OUTPUT AND EVALUATION:

The certification shows a 1-5 star rating and the scoring results from the 5 key indicators.

NOTES:

- benchmarks are national law requisites (Dutch National Building Act 2006)
- quickness and simplicity of evaluation (2-4 hrs)
- current and project state can be easily compared

REFERENCES:

http://gprsoftware.nl/english/

GENERAL INFORMATION

STATE DEVELOPER:	USA, Canada
DEVELOPER:	GBI
RESEARCH STARTED IN:	2004
LAST UPDATE:	2014/15
ANALYSED VERSION:	Existing Buildings EB
APPLICATION:	buildings in Canada and in the United States
AVAILABLE PROFILES/SCHEMES:	• New Construction (NC) • Existing Buildings (EB) • Sustainable Interiors (SI)
OTHER/FORECOMING MODEL: -	

CRITERIA

NUMBER OF CRITERIA: 53
CRITERIA ORGANISATION: criteria are organised in 6 assessment areas (project management, energy, water, materials & resources, emissions, indoor environment)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

Each of the categories and criteria has an assigned number of points that quantify overall building performance with a total sum of 1000 points. The user must first complete the **self-evaluation model**, where he includes or excludes a certain criterion (and its score) in regard to his project. The assessment is then checked by a **Green Globes Assessor**, who completes **third-party evaluation**, sends to the user a **final report** with the **rating assignment**.
No further information is disclosed about the aggregation model and evaluation since the service is available on purchase.

FINAL OUTPUT AND EVALUATION:

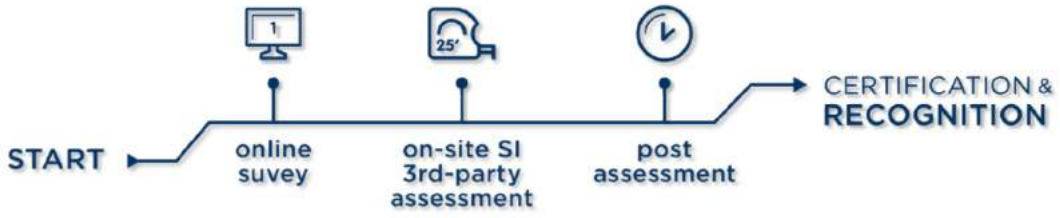
n.d.

NOTES:

- interactive approach with third-party expert

REFERENCES:

http://www.thegbi.org/green-globes-certification/how-to-certify/existing-buildings/



GENERAL INFORMATION

STATE DEVELOPER:	France
DEVELOPER:	Cerway
RESEARCH STARTED IN:	90s
LAST UPDATE:	2014
ANALYSED VERSION:	Assessment scheme for environmental performance of residential buildings
APPLICATION:	buildings in France or abroad (inernational)
AVAILABLE PROFILES/SCHEMES:	• Buildings in Use (HQE Exploitation) • Detached houses (Cerquami) - France • Residential buildings (renovated or used) (Cerqual) - France • Non residential buildings (New, renovated or used) (Certivea) - France
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 14
CRITERIA ORGANISATION: 14 targets are organised in 4 topics (Environment, Energy and Savings, Comfort, Health and Safety)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

For each technical criterion evaluated in each of the 14 targets, four performance levels are determined:

- TP: Top performing;
- P: Performing;
- B: Baseline entry level for HQE certification;
- NC: Non-compliant when level B is not reached.

Each topic is rated on a scale of 0-4 stars, depending on the score attained for each of the targets. The levels outlined hereunder are the **minimum number of targets** to be attained to approve the award of the **stars**.

Topics	*	**	***	****
Energy and Savings Targets: 4, 5 and 7	1 P	1 TP + 1 P	2 TP	2 TP + 1 P
Comfort Targets: 8, 9, 10 and 11	2 P	1 TP + 2 P	2 TP + 1 P	3 TP + 1 P
Health and Safety Targets: 12, 13 and 14	1 P	1 TP + 1 P	1 TP + 2 P	2 TP + 1 P
Environment Targets: 1, 2, 3 and 6	2 P	1 TP + 2 P	2 TP + 1 P	3 TP + 1 P

FINAL OUTPUT AND EVALUATION:

Five rankings are possible depending on the number of stars obtained on each topic.

Overall Level	Minimum levels to achieve
HQE Pass	14 B targets
HQE Good	1 to 4 Stars
HQE Very Good	5 to 8 Stars
HQE Excellent	9 to 11 Stars
HQE Exceptional	≥ 12 Stars

NOTES:

- HQE is a three-step process, formed by an initial phase (application), audits (third party assessment and verification) and the certification released by a commission

REFERENCES:

http://www.behqe.com/tools-and-resources
http://www.sballiance.org/our-work/libraries/haute-qualite-environnementale/

PROTOCOLLO ITACA

GENERAL INFORMATION

STATE DEVELOPER:	Italy
DEVELOPER:	ITACA (Istituto per l'innovazione e trasparenza degli appalti e la compatibilità ambientale - Associazione nazionale delle Regioni e delle Province autonome), supported by iiSBE Italia and ITC-CNR
RESEARCH STARTED IN:	2001
LAST UPDATE:	2016
APPLICATION:	new construction or existing buildings, residential and non-residential
AVAILABLE PROFILES/SCHEMES:	residential, non residential (office, commercial, industrial, education, accomodation), regional profiles (Marche, Puglia, Umbria, Piemonte, Valle d'Aosta, FVG, Lazio, Basilicata)
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 45 (total number of residential and non-residential protocol together)
CRITERIA ORGANISATION: criteria are organised in 3 levels: 5 main areas, each composed of various categories and criterias.

AREAS:	A	Site quality
	B	Resourse Usage
	C	Environmental Loads
	D	Indoor Environmental Quality
	E	Service Quality

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The user evaluates each criterion-card that is available for the type of object he is assessing. Each card provides specific instructions for the evaluation of each criterion, that might be done on the basis of qualitative or quantitative measures. The input value is later normalised on a scale from -1 to +5 points and aggregated to the other criteria of the same category. The aggregation is repeated for every group and level until a final synthetic indicator is provided. The aggregation formula is a simple weighted summation, based on weights that summarise the level of impact of each criterion, which is defined on the basis of its duration, extension and intensity.

FINAL OUTPUT AND EVALUATION:

The final scores is expressed in points on a total of 100. In reference to the obtained performance, the building is rated in a class from A to E.

NOTES:

The protocol was inspired by the SBTool.

REFERENCES:

http://www.itaca.org/valutazione_sostenibilita.asp and available documentation (UNI/PdR 13:1:2015, Protocol for Residential buildings (2016) and for Non-residential buildings (2015).

GENERAL INFORMATION

STATE DEVELOPER:	US and other (international)
DEVELOPER:	national GBC, USGBC
RESEARCH STARTED IN:	1993
LAST UPDATE:	2014
ANALYSED VERSION:	LEED HB (Historic Building) by GBC Italia ed. 2014
CURRENT VERSION:	LEED v.4
APPLICATION:	buildings and urban districts from all over the world
AVAILABLE PROFILES/SCHEMES:	

Italian tools (from Italian homepage):

- New Construction and Refurbishment v. 4 (LEED 2009 Italia NC)
- LEED for Schools
- LEED Core & Shell
- LEED for Commercial Interiors
- LEED for Neighborhood Development
- GBC Home (Italia)
- GBC Quartieri (Italia) – new or redevelopment of urban areas
- GBC Historic Buildings – cultural heritage asset refurbishment

OTHER/FORECOMING MODEL: -

USGBC's tools (from USGBC homepage):

- LEED for Building Design and Construction (BD+C): New Construction, Core and Shell, Data Centers, Healthcare, Hospitality, Retail, Schools, Warehouses and Distribution Centers
- LEED for Operation and Maintenace (O+M): Existing Buildings, Data Centers, Hospitality, Retail, Schools, Warehouses and Distribution Centers
- LEED for Interior Design and Construction (ID+C): Homes, Multi-family Midrise
- LEED for Neighborhood Development (ND): Plan, Built Project
- LEED HOMES

CRITERIA

NUMBER OF CRITERIA: 55 = 47+9 prerequisites
CRITERIA ORGANISATION: criteria are organised in 5 environmental categories + 2 extra groups (SS-sustainable sites, WE-water efficiency, EA-energy & atmosphere, MR-materials & resources, IEQ-indoor environmental quality + IO-innovation in design or operations, RP-regional priority) + Historical Value (only available in the LEED HB tool)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The LEED HB evaluation starts with a critical assessment of the current status and restrictions, which influence the **model tailoring** (possible/impossible interventions and consequently inclusion/exclusion of some parameters + redefinition of the total score per category); the user then checks the **MPR** (minimum program requirements) and **assigns credits** according to the manual's tables; the achieved score compared to the total available points is expressed in **percentage**, which is again turned into **points** according to the manual's specifications.

FINAL OUTPUT AND EVALUATION:

The sum of the final score corresponds to one of the following labels:

- Basic (40-49 pts)
- Silver (50-59 pts)
- Gold (60-79 pts)
- Platinum (>80 pts)

NOTES:

- MPR – minimum program requirements – minimum indispensable characteristics/performance for LEED certification
- prerequisites (not scored) are those characteristics that a project must have to be assessed
- tailoring model (LEED HB): possibility to set maximum affordable performance (as a target), include/exclude criteria
- team-work: cooperation with expert professional figures (LEED HB)

REFERENCES:

http://www.usgbc.org/leed#v4
http://www.gbcitalia.org/certificazione--5?locale=it
http://www.researchgate.net/publication/265550761_LEED_and_HQE_certifications_assessment_in_sustainable_construction

GENERAL INFORMATION

STATE DEVELOPER:	UE
DEVELOPER:	FP 7 EU project, international cooperation
RESEARCH STARTED IN:	2010
LAST UPDATE:	2013
CURRENT VERSION:	OPEN HOUSE v. 1.2
APPLICATION:	new construction or existing buildings in Europe
AVAILABLE PROFILES/SCHEMES:	• Open House AG (Assessment Guideline)
OTHER/FORECOMING MODEL: -	

CRITERIA

NUMBER OF CRITERIA: 56, LCA based
CRITERIA ORGANISATION: criteria are organised in 6 main categories (environmental quaility, social/functional quality, economic quality, technical characteristics, process quality, the location)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

Fulfiling requirements set by **sub-indicators** awards a certain amount of **points** ranging from **0 to 100** depending on the performance met. Each sub-indicator is **weighted from 0 to 4**, with 0 meaning the subindicator is irrelevant, and 4 it is of high importance. The **score for each indicator** is the **weighted average** of the points awarded for the sub-indicators. Each indicator is weighted from 0 to 4, and the score achieved for each category is the weighted average of the points awarded for the indicators. The final building performance is obtained by calculating the **average of the environmental, social and economic category** scores. (Environmental, social and economic categories are equally weighted 33-33-33%) The three other categories are evaluated separately.

FINAL OUTPUT AND EVALUATION:

no information was found on the argument

NOTES:

- OPEN HOUSE is a proposition for a common European methodology which provides a mechanism for existing sustainability methods to be compared. The proposed tool is user friendly, less complicated and non-commercial methodology.
- OPEN HOUSE provides a sustainability Framework of indicators which can be implemented across Europe in a consistent manner for comparability of green buildings between countries.

REFERENCES:

http://www.openhouse-fp7.eu/
http://www.openhouse-fp7.eu/assets/files/OPEN_HOUSE_AG1.2.pdf
http://cordis.europa.eu/result/rcn/146939_en.html

GENERAL INFORMATION

STATE DEVELOPER:	Spain, Valencia
DEVELOPER:	IVE
RESEARCH STARTED IN:	2009
LAST UPDATE:	2011
CURRENT VERSION:	n.d.
APPLICATION:	new construction or existing buildings in Valencian Community and Region of Murcia, Spain
AVAILABLE PROFILES/SCHEMES:	one for all
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 51
CRITERIA ORGANISATION: criteria are organised in 5 main categories (energy saving, sustainable use of natural resources, acoustic comfort, space functionality, accessibility)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

Each criterion is awarded a certain amount of points. The achived scores are simply summed together to obtain a final result.

FINAL OUTPUT AND EVALUATION:

There are only two rankings: the "High Level" rating is awarded for scores over 40, while "Very High Level" is earned for scores is in excess of 55 points. These levels are identified by the colors gold and silver, respectively. PdC certification requires achieving at least the 'High Level' rating in the 'Energy saving' and 'Environmental protection' categories. So that minimum requirements are (for new and existing buildings) 40 points in Energy saving and 40 points in Sustainability.

NOTES:

- it can be applied to both the design phase (by setting a target PdC level and with the help of an external advisor) and the construction phase (an auditor controls the correspondance of the building to the original project)

REFERENCES:

http://www.sballiance.org/our-work/libraries/perfil-de-calidad-pdc-quality-profile/
http://www.perfildecalidad.es/es/index.php
http://www.five.es/inicio/certificacion.html

PROMISE Rakennusten ympäristöluokitus

GENERAL INFORMATION

STATE DEVELOPER:	Finland
DEVELOPER:	VTT
RESEARCH STARTED IN:	n.d.
LAST UPDATE:	2006
CURRENT VERSION:	-
APPLICATION:	Residential, Office and Retail Buildings in Finland
AVAILABLE PROFILES/SCHEMES:	• existing buildings (KIINTEISTÖ) • new buildings and major refurbishments (HANKE)
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 44
CRITERIA ORGANISATION: criteria are organised in 4 main categories (health of users, consumption of natural resources, environmental loadings and environmental risks)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

he value of an indicator has to be selected between the E-level, which represents normal level, and the A-level, which represents excellent level. The indicators and categories has been weighted in such a way that the final result can be expressed in terms of one class (A, B, C, D or E). The selection of weighting values for different categories and indicators took place in working seminars in cooperation with different actors of building sector.

FINAL OUTPUT AND EVALUATION:

no information was found on the argument

NOTES:

-

REFERENCES:

http://virtual.vtt.fi/virtual/proj6/environ/ympluok_e.html
http://www.motiva.fi/files/2229/HankePromiseManual.pdf http://www.motiva.fi/files/2230/KiinteistoPromiseManual.pdf

SBTool iiSBE

GENERAL INFORMATION

STATE DEVELOPER:	International
DEVELOPER:	iiSBE
RESEARCH STARTED IN:	1998
LAST UPDATE:	2014
CURRENT VERSION:	SBTool 2014
APPLICATION:	site and building assessment, New Construction or Renovation, various uses and building types, international
AVAILABLE PROFILES/SCHEMES:	
•	12 different occupancies
•	New Construction
•	Renovation

OTHER/FORECOMING MODEL: -

CRITERIA

NUMBER OF CRITERIA: up to 191 criteria
CRITERIA ORGANISATION: criteria are organised in 8 issue areas (S: location, services and site characteristic; A: site regeneration and development, urban design and infrastructure; B: energy and resource consumption; C: environmental loadings; D: indoor environmental quality; E: service quality; F: social, cultural and perceptual aspects; G: cost and economic aspects)

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The tool adopts a weighted summation approach: the score is calculated by first multiplying each value by its appropriate weight followed by summing of the scores for all criteria. Scores measured on different scales must be first standardised to a common dimensionless unit and then the weightes summation can be applied.
The weighting system consists of 5 scalar factors that are used to construct final weights for criteria. Each factor is assigned a score, depending on which position on the scale is chosen. The algorithm is: Weight score = Primary issue x Intensity x Duration x Extent x Adjustment factor.
On the other hand, the scoring requires the use of benchmarks, which can be set in a specific worksheet (SBTool Bmk) according to national or local normative. The scoring range goes from -1 to 5, whit 0 corresponding to "Minimum Practice", 3 "Good Practice" and 5 "Best Practice". The user can introduce his text description or numerical values to provide thhese three performance levels, whereas a formula automatically determines the intermediate values (File A). With these referencial points, the user can then complete File B by introducing target or self-assessed scores, which are then turned into weighted scores and aggregated into a final score from 0-5.

FINAL OUTPUT AND EVALUATION:

The final aggregated score (between 0 and 5) is converted into a letter score from G (worst) to A+ (best grade), which is the final label.

NOTES:

- different criteria configuration according to pre-design / design / construction / operation phase
- 4 scope levels: developer / min. / mid. / max. which enable/disable criteria
- criteria trade-offs and tailoring
- separate modules are provided for Site and Building assessments
- mixed-use projects assessment: weights are automatically pro-rated according to areas of various occupancies to reflect the different performance characteristics of various occupancy types

REFERENCES:

http://iisbe.org/sbtool-2012

SMEBS

GENERAL INFORMATION

STATE DEVELOPER:	Slovenia
DEVELOPER:	Jernej Markelj, UL FA
RESEARCH STARTED IN:	approx. 2011-2013
LAST UPDATE:	2016
APPLICATION:	building sustainability at early planning stages (new construction)
AVAILABLE PROFILES/SCHEMES:	only one
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 33 criteria consider the entire life-cycle of the building
CRITERIA ORGANISATION: the building sustainability is evaluated in regard to three aspects (environmental a. – burden on the natural environment; user a. – quality of the built environment; financial s. economic efficiency). The aspect level is divided into 5+3+2 categories (totally 10) that are further specified in level 4 – the criteria level.

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The user (project planner) assesses the project with the 33 criteria, that have a priority weighting based on the judgement of a panel of experts. The weights have been defined by means of the AHP approach, which is based on the pairwise comparison between two parameters.
The criteria are assessed on a 4 grade scale expressed in percentage that measures the project's fulfilment of the specific criteria demands: 0% = does not fulfil; 33% = partially fulfils; 67% mostly fulfils; 100% = completely fulfils. The assessment can be quantitative – the result calculated with specific softwares is recorded in the SMEBS worksheet and automatically turned into the above mentioned scale– or qualitative – based on user's opinion that expresses his estimation with the help of the criteria description.
The model is applied at the first stages of the planning process and is part of a wider method that explains the whole procedure (from the planning, to execution and management) that should be followed in order to guarantee a sustainable new construction.

FINAL OUTPUT AND EVALUATION:

The final score is the sum of all points obtained in reference to the evaluated criteria. The points are calculated on the basis of the criterion fulfilment and the experts' weight. However, at the end of each step of the wider method, a certification can be assigned to the project/building by an external commission.

NOTES:

- open structure of the tool: possibility to exclude individual criteria – the weighted portion is proportionally distributed amongst the other criteria
- quantitative values are to be assessed with other, freesource software
- the tool is meant for early application on new construction projects
- it is provided with a series of suggested solutions that help the designer during the initial planning phases

REFERENCES:

http://www.mdpi.com/2071-1050/6/12/8775
Markelj, J. (2016). *Model za arhitekturno-tehnološko vrednotenje trajnostnih stavb* (Doctoral dissertation). Supervisors: M. Zbašnik-Senegačnik, M. Kitek-Kuzman. Ljubljana: Univerza v Ljubljani, Fakulteta za arhitekturo.

SuPerBuildings

GENERAL INFORMATION

STATE DEVELOPER:	UE
DEVELOPER:	EU FP7, VTT + consortium of BRE (UK), CSTB (FR), CSTC (Belgium), KIT (Germany), CVUT (Czech Rep.), IAO (Germany), LABEIN (Spain),
RESEARCH STARTED IN:	2010
LAST UPDATE:	2012
APPLICATION:	new construction or existing buildings, international
AVAILABLE PROFILES/SCHEMES:	• core (basic and quick evaluation) • complete assessment
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 22 divided into core indicators (of key importance) and additional indicators (less common)
CRITERIA ORGANISATION: there are three main sustainability pillars – environment, society, economy – each divided into further levels: subject of concern, issue and indicator. For every indicator the following information is provided:

- indicator definition
- validity (explanation and justification)
- object of assessment
- characterisation
- assessment in design and operation
- comparability
- sources of information

EVALUATION PROCEDURE AND AGGREGATION MODEL:

SuperBuildings, as Open House, is a research programme that tried to find a common solution to internation (Eurpean) sustainability assessment. It has collected core sustainability indicators suggested by standards and different rating systems and has tested their validity, but no specific evaluation procedure has been defined. The tool only gives reccomendations on how a criterion can be quantified (from qualitative to quantitative assessment – indicator definition) and how benchmark should be defined.
With regard to the formal weighting process, it reccomends to adopt a multi-level structured list of issues whose weighting factors should be defined level by level with the help of an expert forum. According to SuperBuildings the most used method is the AHP approach, but simpler scoring methods like SWING, SMART or SMARTS would be quicker.
Weights, as benchmarks, could vary from region to region in order to take into account local normative and conditions. However, economic, environmental and social sustainability should be considered equally.

FINAL OUTPUT AND EVALUATION:

No information is available.

NOTES:

- it is not meant for evaluation but for spreading knowledge
- the tool was developed in parallel with Open House project, but this one adopted a top-down approach, i.e. goals must be defined first and criteria are consequent
- equal consideration is given to economic, environmental and social sustainability (as in Open House)

REFERENCES:

http://cic.vtt.fi/superbuildings/
http://cordis.europa.eu/publication/rcn/15929_en.html
www.vtt.fi/inf/pdf/technology/2012/T72.pdf

Valideo

GENERAL INFORMATION

STATE DEVELOPER:	Belgium
DEVELOPER:	SECO, BCCA, WTCB-CSTC
RESEARCH STARTED IN:	n.d.
LAST UPDATE:	2008
APPLICATION:	new construction or existing buildings in Belgium
AVAILABLE PROFILES/SCHEMES:	
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 16
CRITERIA ORGANISATION: criteria are organised in 4 main themes, each composed by 4 subcategories:

- SITE & CONSTRUCTION
  - integration
  - construction site
  - materials
  - adaptability
- COMFORT & HEALTH
  - hygrothermal
  - visual
  - acoustic
  - health
- MANAGEMENT
  - energy
  - water
  - maintenance
  - waste
- SOCIAL VALUE
  - living environment
  - mobility
  - accessibility
  - protection intrusions

EVALUATION PROCEDURE AND AGGREGATION MODEL:

No information is currently available (due to website maintenance)

FINAL OUTPUT AND EVALUATION:

The final scores is expressed in points on a total of 100. In reference to the obtained performance, the building is rated in a class from A to E.

NOTES:

-

REFERENCES:

http://www.valideo.org/Public/valideo_home.php
http://www.province.luxembourg.be/servlet/Repository/11-03-25-l-laret-valideo.pdf

villas
stately homes and castles

GENERAL INFORMATION

STATE DEVELOPER:	Italy
DEVELOPER:	group of economists within Interreg IIIA
RESEARCH STARTED IN:	2006
LAST UPDATE:	2010
ANALYSED VERSION:	Sustainability assessment model
APPLICATION:	refurbishment / re-use of Venetian Villas
AVAILABLE PROFILES/SCHEMES:	• Vocationality assessment model • Sustainability assessment model
OTHER/FORECOMING MODEL: -	

CRITERIA

NUMBER OF CRITERIA: 21 attributes split in 58 indicators
CRITERIA ORGANISATION: criteria are organised in three categories (called criteria)– intrinsic sustainability, environment, economic-financial feasibility; the environment criterion (context quality) is also divided into three sub-criteria: reversibility, versatility and invasivity; whereas all the three groups together provide 21 attributes that are further specified, leading to 58 assessment elements.

EVALUATION PROCEDURE AND AGGREGATION MODEL:

Villas tool adopts a multi-criteria (MC) approach derived from the Multi-Attribute Value Theory (MAVT) and in particular a multi-linear operator insitead of the widely used weighted averaging. A special feature of the proposed method is the ability to include interactions among subset of criteria.
In practice, the user evaluates the project's performance in reference to every assessment element. His score is then aggregated by means of weights, that have been previously defined by a panel of experts. Their opinions on edges situation (all possible combinations of subset criteria in extreme conditions) have been next synthetised through arithmetic mean. In conclusion, each element-weight contains the nominal value of the sole parameter and all contributions (surplus value) obtained by the simultaneous fulfilment of other criteria wihin the same subset.
FINAL OUTPUT AND EVALUATION: The final aggregated score (between 0 and 1) does not lead to a label or certification, since the aim of the tool is to provide a support for decision makers in the planning procedure of re-use projects of Venetian Villas. Therefore, the synhetic indicator, as well as the other results from more detailed levels, are particularly useful in comparing and choosing among different alternatives and scenarios testing.

NOTES:

- the tool is specifically structured for an application on Venetian Villas heritge, however the method can be adapted to other study cases
- the evaluation model is expert-based and takes into account inteactions among criteria

REFERENCES:

Galli, R., Lioce, R. (eds), (2006). Villas, stately homes and castles: compatible use, valorisation and creative management, vol. 2, Venezia: Ed. Lunargento.
Giove, S., Rosato, P., Breil, M. (2011). An Application of Multicriteria Decision Making to Built Heritage. The Redevelopment of Venice Arsenale. Journal of Multi-Criteria Decision Analysis, 17, 85-99.

VILLARINHOROSA

GENERAL INFORMATION

STATE DEVELOPER:	Brasil
DEVELOPER:	VillarinhorRosa and Naked Haddad
RESEARCH STARTED IN:	2013
LAST UPDATE:	2013
APPLICATION:	existing buildings in the state of Rio de Janeiro
AVAILABLE PROFILES/SCHEMES:	only one
OTHER/FORECOMING MODEL:	-

CRITERIA

NUMBER OF CRITERIA: 45
CRITERIA ORGANISATION: criteria are organised in 3 criteria – economic, environmental and social aspects – subdivided in 10 items for verification (subcriteria) and again in 45 families of indicators.

EVALUATION PROCEDURE AND AGGREGATION MODEL:

The score of each family of indicator can be equal to 0.0 (does not meet basic requirements), 0.5 (meets basic requirements) or 1.0 (exceeds basic requirements). The obtained note is multiplied by the weight of he family of indicators in order to give the result of the family of indicators. If the sum of all the family of indicators belonging to a subcriterion is multiplied by the subcriterion weight, the total result of the subcriterion is provided. In order to get the result of the criterion, the user should repeat the procedure with pertinent weights. Finally, the evaluation result is the sum of the economic aspect score (whose weight is 43%), the environmental aspect score (weighted 43% as well) and the social aspects (with a minor impact: 14%).
The method adopted for weighting definition is the AHP approach, based on experts' opinion.

FINAL OUTPUT AND EVALUATION:

The final score is expressed in percentage of points earned compared to total possible score and leads to 3 levels of performance rating:

- in search of new paradigms (80-100%)
- sustainable (50-79%)
- towards sustainability (0-49%)

NOTES:

-

REFERENCES:

http://www.hindawi.com/journals/jcen/2013/578671/

ATTACHMENT II – QUESTIONNAIRES FOR THE DETERMINATION OF WEIGHTS

II.1 VOC_A: Vocationality Model – Part A

Approach and Questionnaire Composition

The VOC_A questionnaire was meant to evaluate the importance of certain features that can be found in the context or in the B&S[140] to re-use on the choice of a new, compatible function.

The questionnaire was submitted to both Slovenian and Italian decision-makers, respectively from Nova Gorica and Gorizia.[141] 2+2 persons were found for each of the following profiles: public administrators, urban planners, architects and investors, often related to the EGTC GO group as well. All the interviews were conducted face-to-face, so that both the approach and the parameters were explained thoroughly.

The questionnaire starts with a brief presentation of the problem, objective and approach, followed by the vocationality tree and the explanation of the five uses to consider: residential, production, accommodation, commercial & administration, public.

The first part gathers personal information of the respondent, as for instance: country, age, sex, job, education and a self assessment of the level of acquaintance with the problem of defining new uses for buildings and areas. In order to facilitate a correct understanding of the task, an example of evaluation is provided with the main question to answer:

Q: *Given an abandoned architecture with its site in Gorizia or Nova Gorica, where the feature X is optimal (fully satisfied) and the others are at their worst (not satisfied), how much do you think such combination would influence the choice of each of the five considered uses on a scale 0-100 (0=poor, 100 = excellent)?*

The participant had to fill in five different tables referring to the vocationality tree, where she/he had to express a judgement between 0 and 100 for every possible combination of features and for each of the proposed uses. Values for boundary situations with NO parameter satisfied/present and for the combination of ALL parameters satisfied/present were already defined and were equal to 0 and 100 respectively. At the beginning of the table the considered features are briefly described to facilitate a correct comprehension of parameters (see: A_II.1).

Results and Discussion

All respondents are over 36 and are mostly male (10/16), the majority (81,2%) accomplished Master's Degree and has a good knowledge or some experience in deciding on new functions for buildings and sites.

CONTEXT QUALITY						
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED PER USE				
		RES	**PRO**	**ACC**	**C&A**	**PUB**
1) ECOLOGICAL ENVIRONMENTAL QUALITY	*includes panoramic views, presence of natural sites and parks in a healthy environment*	0,256	0,109	0,288	0,144	0,172
2) BUILT ENVIRONMENT QUALITY	*presence of wine & food trails, facilities proximity (sport, education, commerciall, etc.); (cultural-historic cities/sites or trails)*	0,269	0,166	0,241	0,216	0,200
3) POSITION & ACCESSIBILITY	*the building is situated in the most suitable location (urban-suburban) for the considered use and is well serviced with local and /or major infrastructures*	0,228	0,375	0,222	0,309	0,259

[140] Building and site (=plot).
[141] Participant live in these cities or know very well this region due to past work/research experience.

4) TRANSPORT FACILITIES	*the object is in an area well serviced by public transport and bicycle or walking trails*	0,219	0,266	0,203	0,234	0,263
1) + 2)	-	0,591	0,306	0,603	0,394	0,416
1) + 3)	-	0,516	0,516	0,541	0,488	0,488
1) + 4)	-	0,503	0,388	0,525	0,400	0,466
2) + 3)	-	0,522	0,581	0,509	0,581	0,541
2) + 4)	-	0,503	0,484	0,488	0,531	0,563
3) + 4)	-	0,438	0,691	0,438	0,597	0,575
1) + 2) + 3)	-	0,772	0,661	0,741	0,694	0,663
2) + 3) + 4)	-	0,703	0,825	0,650	0,794	0,784
1) + 3) + 4)	-	0,716	0,734	0,719	0,719	0,741
1) + 2) + 4)	-	0,747	0,538	0,750	0,628	0,678

In general, points are well distributed and participants awarded almost all combinations with some extra-points, showing that joint situations are preferable for their synergetic effects. Only in 6/50 cases the result is inferior to the sum of the single components, however such difference is minimal (1-2 points on a 100 scale). Overall judgements seem coherent among the five groups of uses and within the same category (use).

Analysing results in reference to use, it can be observed that all four parameters are very important to the residential group, which is probably due to divergent opinions of the participants. However, according to average results, the most interesting feature is the built environment due to facilities proximity, followed by the presence of green areas represented by the ecological environmental quality; position and accessibility are ranked third with transport facilities immediately after.

The production column provides totally different priorities that are though shared by most participants: position & accessibility obtained the highest weight within the table, on the contrary, the minimum was assigned to the ecological environmental quality; built environment is slightly interesting, whereas public transport becomes more important, probably because of a certain sensitivity to communal-mobility as part of work and a way to reduce daily costs.

For accommodation environmental quality is essential, followed by the other features respecting the list order and with a limited difference between them. The answers provided for this use are quite similar, since the first two parameters are the most important to all participants.

An inverse order of preference can be noticed for public uses, where it is a shared opinion that transport and position are the most important. Finally, the commercial and administrative group (hereafter: c&a) obtains the same ranking as production yet with more similar values.

ECONOMIC CONTEXT						
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED PER USE				
		RES	**PRO**	**ACC**	**C&A**	**PUB**
1) TYPE OF ZONE	*the subject is situated in the most suitable zone (among: residential, production, touristic, etc.) according to the urban plan (or to the zone character) and in reference to the use considered*	0,766	0,619	0,541	0,528	0,631
2) VISIBILITY	*building potential to be seen due to strategic position or context set-up (ex.: not hidden by trees, other buildings, etc.)*	0,188	0,316	0,403	0,441	0,303

Type of zone prevails on visibility in all five cases, however both are almost equally important for the c&a group and for accommodation, where also visibility seems to be a significant requisite. According to the participants, public and production uses depend much more on the type of zone, whereas visibility is a secondary condition.

This is even more explicit for residence, where visibility is not requested, but could represent a positive feature as a theft deterrent.

Results for this part are congruous among participants for the residential, production and public uses, but have some discrepancy in the accommodation and c&a column, where zone is predominant except in case of parity (6/16 for both).

B&S VERSATILITY						
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED PER USE				
		RES	**PRO**	**ACC**	**C&A**	**PUB**
1) BUILDING VERSATILITY	*the building is well-disposed to change (few limitations, high layout flexibility, space fractionability, distribution variation, service adaptability, raising or enlargement possibilities)*	0,534	0,584	0,559	0,588	0,519
2) SITE VERSATILITY	*the site is well-disposed to change (is not protected, can be rearranged; can modify its built asset (new construction or demolition of existing secondary buildings))*	0,413	0,372	0,391	0,366	0,413

Similarly, the possibility to modify the construction – building versatility – is always greater[142] than the opportunity to change open areas – site versatility. This is especially true for production and the c&a group, whereas the difference between the two preferences comes closer in the accommodation, residential and public columns. Comparing also the site efficiency/site availability and size from the following table, it can be observed that production is very likely to need open areas, though it pays more attention to the building modifiability; in other cases, size availability is well-accepted, but it should be associated to the possibility to change open areas, in order to maximise the result.

B&S QUALITY						
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED PER USE				
		RES	**PRO**	**ACC**	**C&A**	**PUB**
1) BUILDING QUALITY & FEATURES	*the building has a special appeal and features, or a historic character; secondary buildings are also available*	0,288	0,122	0,306	0,300	0,281
2) BUILDING EFFICIENCY	*available size/volume, height and floor load are compatible with the proposed use*	0,294	0,453	0,263	0,331	0,309
3) SITE QUALITY & FEATURES	*the site is pleasant and rich in biodiversity with some special features, has low risks and pollution*	0,231	0,119	0,266	0,144	0,184
4) SITE EFFICIENCY*	*the plot has an appropriate size for the considered use*	0,175	0,281	0,147	0,194	0,216
1) + 2)	-	0,606	0,594	0,609	0,678	0,609
1) + 3)	-	0,569	0,294	0,597	0,469	0,481
1) + 4)	-	0,500	0,428	0,503	0,513	0,513
2) + 3)	-	0,591	0,578	0,550	0,459	0,509
2) + 4)	-	0,519	0,713	0,472	0,525	0,544
3) + 4)	-	0,422	0,394	0,416	0,334	0,372
1) + 2) + 3)	-	0,846	0,719	0,831	0,775	0,772
2) + 3) + 4)	-	0,724	0,846	0,694	0,663	0,709
1) + 3) + 4)	-	0,722	0,541	0,728	0,666	0,681
1) + 2) + 4)	-	0,778	0,847	0,747	0,822	0,800

* This parameter was later renamed to “SITE AVAILABILITY & SIZE”.

[142] The observation is referred to average results, while analysing single answers in certain cases the two options are equal. Only the public area provides discordant opinions: parity (3/16), site versatility is greater (4/16), building versatility is greater (9/16).

Building efficiency, i.e. construction's physical and technical aspects, is the most important feature within the set. The only exception is the assessment for accommodation, where the building quality and features is first, followed by the equally important building efficiency and site quality & features, and site availability and size as last: this suggests that availability of certain spaces is not enough without quality and that quality/historic character or aesthetic features are perceived as an attraction for customers and therefore the main ingredient for a successful investment in accommodation. Residences obtained similar scores; the building efficiency is in this case the most important feature, for great importance was given to the size of the subject rather than to indoor height or floor load. Moreover, looking at the results from VOC_B questionnaire, the most appropriate size is definitely the small one, which indicates a preference for single houses rather than residential blocks. The second ranked parameter is the building quality, followed by the site quality, which should be probably interpreted as a general preference to live in a "beautiful" house and environment rather than the desire to live in a historic asset with a special garden. On the other hand, public and c&a uses are more prone to occupy historic buildings, as the first are often seen as the main investors who should take care of public heritage and the latter are usually located in the city centre, where such buildings can be found. In addition to this, some participants stated that the fascinating component of historic assets may attract customers (retail) and gives a formal appearance to offices. Availability of open areas is much more important to public spaces than to c&a, especially in reference to schools or sport centres.

Most combinations were awarded with some extra-point reaching up to +6, whereas 2/50 combinations confirmed their summed-up-values and in 12/50 cases there is a sub-additive effect of -1 to -3 points on a 100 scale. The cause might be an over-estimation of single components or the overlapping of some features; the difference is though rather limited.

Looking at non-aggregated answers, opinions are sometimes divergent: with regards to residential use, most have in common only the fact that transport comes last; in the accommodation column participants often assign the first position to building quality or to the site quality, but generally agree on the other two parameters; finally, results are different also for public functions, where the majority of respondents give importance to building efficiency and differ on other parameters.

VERSATILITY						
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED PER USE				
		RES	**PRO**	**ACC**	**C&A**	**PUB**
1) CONTEXT QUALITY	*good quality of the ecological and built environment, good position, accessibility and transport facilities*	0,316	0,219	0,303	0,275	0,284
2) ECONOMIC CONTEXT	*appropriate zone type and visibility*	0,194	0,284	0,216	0,297	0,209
3) B&S QUALITY	*building and site are efficient and provided with good qualities and features*	0,269	0,200	0,256	0,200	0,238
4) B&S VERSATILITY	*building and site are highly flexible and modifiable*	0,194	0,256	0,172	0,191	0,200
1) + 2)	-	0,509	0,541	0,534	0,609	0,519
1) + 3)	-	0,584	0,453	0,578	0,494	0,547
1) + 4)	-	0,556	0,481	0,506	0,500	0,513
2) + 3)	-	0,456	0,503	0,484	0,522	0,488
2) + 4)	-	0,419	0,544	0,425	0,506	0,450
3) + 4)	-	0,463	0,463	0,431	0,406	0,456
1) + 2) + 3)	-	0,734	0,703	0,775	0,778	0,756
2) + 3) + 4)	-	0,644	0,731	0,659	0,694	0,669
1) + 3) + 4)	-	0,775	0,684	0,753	0,684	0,756
1) + 2) + 4)	-	0,675	0,766	0,713	0,769	0,731

Answers from this part are concordant only for the residential part, where participants chose that context quality – the location of the subject – and the building and site quality are essential, while zone type (being in a residential zone) and the b&s versatility are not fundamental. By contrast, opinions on the other uses are not

so harmonious: in the production part priorities are rather different, but average scores show that economic context is the most important feature, followed by versatility conditions, context quality and b&s quality as last; slightly less dissimilar are the assessment for accommodation, where participants often picked context quality and b&s quality as leading characteristics for this use; with regards to c&a, results focus on the importance of location – context quality and economic context – while the building and its site are of secondary importance; 11/16 opinions agree that context quality comes first when talking about public functions, while other preferences are distributed among the remaining features, leading to a general ranking, where b&s quality is second, economic context third and b&s versatility last.

Combinations are generally awarded with some extra points (up to +4 on a 100 scale), in certain cases are equal to the sum of single parameters' values and only in the residential column have some sub-additive effects (30% of cases), probably due to partial overlapping or interrelation of parameters.

II.2 VOC_B: Vocationality Model – Part B

Approach and Questionnaire Composition

The aim of this second questionnaire, called VOC_B, was to evaluate the impact of more specific features of the vocationality tree on the choice of a new compatible function for a building and its site (plot) that are hypothetically situated in the territory of Gorizia and Nova Gorica.

Like the first questionnaire, VOC_B has also collected the opinions of various figures from the designers' world – architects, landscape designers, urbanists; in addition to this, it included the participation of local people – citizens from the study area – that have not been involved earlier due to the easier evaluation approach in this second part and because of the type of features to be considered, that are here more specific and sometimes explained through examples from the reference region.

After completing the personal profile[143], the interviewed had to say how the considered feature affects each use (residential / production / accommodation / commercial & administration / public), or, in other words, what is the impact of the considered parameter on each of the 5 possible uses described at the beginning of the questionnaire. In the evaluation table each feature is briefly defined, in order to facilitate the assessment, based on the table below:

+	+3	definitely positive
	+2	quite positive
	+1	slighlty positive
	0	ininfluential
-	-1	slightly negative
	-2	quite negative
	-3	definitely negative

Total respondents in this part were 12, equally distributed between the two countries (6+6) and among the selected personal profiles: 2 architects, 2 urbanists or landscape architects, 2 citizens. Moreover, almost all interviews were conducted face-to-face.

[143] The personal profile section is identical in all questionnaires.

Data Processing

Collected answers were turned into a range 0-1 according to the table below:

VALUE ASSIGNED BY RESPONDENTS	*LEVEL OF INFLUENCE*	EQUIVALENT POINTS
+3	*definitely positive*	1,00
+2	*quite positive*	0,83
+1	*slighlty positive*	0,67
0	*ininfluential*	0,50
-1	*slightly negative*	0,33
-2	*quite negative*	0,17
-3	*definitely negative*	0,01

The parameter weights were then defined as the average value (arithmetic mean) of all answers.

Results and Discussion

FEATURES			**WEIGHT PER USE**				
2nd level	3rd level	4th level	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
ECOLOGICAL – ENVIRONMENTAL QUALITY	LANDSCAPE QUALITY		0,97	0,47	0,97	0,71	0,75
	NATURAL AMENITIES		0,97	0,49	0,93	0,67	0,88
	HEALTH		1,00	0,61	0,92	0,78	0,94
BUILT ENVIRONMENT QUALITY	WINE & FOOD TRAILS		0,71	0,54	0,98	0,56	0,74
	FACILITIES PROXIMITY		0,87	0,67	0,75	0,75	0,78
	gastronomy		0,74	0,72	0,96	0,83	0,83
	education facilities		0,99	0,64	0,56	0,63	0,82
	public administration		0,83	0,65	0,61	0,81	0,72
	medical provision		0,88	0,67	0,76	0,64	0,72
	sport & leisure facilities		0,89	0,65	0,79	0,71	0,87
	service providers/retail/commercial		0,90	0,65	0,81	0,86	0,70
POSITION & ACCESSIBILITY	POSITION		*0,70*	*0,70*	*0,70*	*0,90*	*0,70*
	urban centre		0,82	0,12	0,89	0,99	0,90
	city/town edge		0,87	0,49	0,71	0,53	0,74
	suburban		0,76	0,67	0,63	0,43	0,57
	LOCAL ACCESSIBILITY		*0,80*	*0,60*	*0,60*	*0,90*	*0,75*
	county road		0,38	0,74	0,64	0,50	0,43
	urban/local road		0,78	0,56	0,74	0,68	0,70
	MAJOR INFRASTRUCTURES		0,53	0,87	0,74	0,56	0,47
	highway exit		0,34	0,92	0,69	0,54	0,39
	railway station		0,72	0,82	0,78	0,57	0,56
TRANSPORT FACILITIES	PUBLIC TRANSPORT		0,93	0,76	0,86	0,89	0,92
	bus stop proximity		0,93	0,78	0,87	0,92	0,94
	bus frequency		0,93	0,75	0,85	0,86	0,89
	BICYCLE & WALKING		0,92	0,67	0,86	0,82	0,85
ECONOMIC CONTEXT	TYPE OF ZONE		0,77*	0,62*	0,54*	0,53*	0,63*
	residential		1,00	0,13	0,72	0,65	0,70
	production		0,06	0,96	0,12	0,35	0,17

	touristic/gastronomic	0,76	0,24	1,00	0,74	0,63
	administrative/commercial	0,54	0,54	0,56	0,99	0,72
	agricultural	0,67	0,38	0,70	0,35	0,27
	VISIBILITY	0,19*	0,32*	0,40*	0,44*	0,30*
BUILDING QUALITY & FEATURES	APPEAL/HISTORIC CHARACTER	0,86	0,50	0,94	0,79	0,89
	SECONDARY BUILDINGS	0,82	0,78	0,67	0,74	0,75
	SPECIAL FEATURES	0,97	0,50	0,97	0,64	0,68
BUILDING EFFICIENCY	VOLUME SIZE	*0,95*	*0,95*	*0,78*	*0,85*	*0,89*
	small (<1000 mc)	0,87	0,36	0,63	0,57	0,21
	medium (1000-5000 mc)	0,68	0,67	0,75	0,75	0,70
	big (>5000 mc)	0,40	0,92	0,63	0,58	0,86
	HEIGHT <3m	0,82	0,30	0,78	0,83	0,61
	FLOOR LOAD >300kg/sqm	0,58	0,96	0,68	0,70	0,89
SITE QUALITY & FEATURES	AMENITY/BIODIVERSITY	0,92	0,42	0,94	0,61	0,83
	SAFETY & HEALTH	1,00	0,47	0,93	0,82	0,90
	FEATURES	0,94	0,42	0,82	0,67	0,90
SITE AVAILABILITY & SIZE	AREA SIZE	-	-	-	-	-
	small (<100%)	0,65	0,53	0,67	0,64	0,56
	medium (100-200%)	0,79	0,72	0,68	0,63	0,74
	big (>200%)	0,85	0,81	0,72	0,61	0,90
BUILDING VERSATILITY	TRANSFORM. VS. LIMITATION	0,52	0,30	0,56	0,51	0,59
	preservation of the exterior	0,62	0,36	0,62	0,55	0,64
	preservation of the interior	0,47	0,27	0,44	0,50	0,54
	building techniques	0,43	0,26	0,45	0,39	0,52
	preservation of specific elements	0,57	0,32	0,72	0,58	0,68
	INTERIOR SPACE FRACTIONAB.	0,83	0,97	0,79	0,83	0,90
	DISTRIB. VAR. & INDEP. UNITS	0,93	0,88	0,89	0,89	0,88
	SERVICE ADAPTABILITY	0,83	0,89	0,82	0,85	0,86
	ENLARGEMENT OPPORTUNITIES	0,83	0,88	0,83	0,82	0,86
SITE VERSATILITY	TRANSFORM. VS. LIMITATION	0,63	0,22	0,71	0,51	0,63
	animal/landscape protection area	0,53	0,14	0,65	0,42	0,48
	preservation of specific elements	0,74	0,29	0,76	0,60	0,78
	BUILT ASSET VARIATION	0,83	0,85	0,76	0,76	0,81
	new building construction	0,76	0,83	0,68	0,71	0,75
	demolition of secondary buildings	0,90	0,86	0,83	0,81	0,87

HIGHLIGHTED WEIGHTS: are defined on the basis of average assessment of sub-features (3rd or 4th level)
HIGHLIGHTED ITALIC WEIGHTS: are defined on the basis of personal knowledge and participants' opinions or comments expressed during the questionnaire compilation, both in reference to the values applied to other features within the same group.
* WEIGHTS: are derived from VOC_A questionnaire; AREA SIZE's results are directly copied into the next level (no weight is requested since the set is composed of only one component).

Opinions are generally concordant on the positive or negative sign of the evaluation with rather some variation in size (1-3) due to subjective preferences. The only disharmony can be noticed in the parameters describing "transformation vs. limitation", where the limitation of modifiability was sometimes interpreted as an added value to the building and its site (e.g.: for residential, accommodation, public uses), therefore leading to a positive outcome.

However, results show that the environmental-ecological quality is a decisive requisite for the choice of a residential use, then followed by the accommodation, public, office and commercial purposes, whereas it is uninfluential in the production case. Presence of wine and food trail is obviously an attraction for accommodation, while residential sector depends a lot on the service proximity and in particular on education facilities. Other uses show high values for homologous facilities due to a cluster effect – similar buildings/uses are preferably near to each other, what is confirmed by the "type of zone" evaluations, where a total incompatibility can be observed between production and residential (less with c&a).

Predictably, production fits better in suburban areas with "county roads" and major infrastructure connections, whereas all other uses prefer central context with urban roads and rather the vicinity to the railway station than the highway exit. On the contrary, public transport is important to all five uses and walkways or bicycle paths reach slightly inferior results.

Building quality and features are again very valuable for residential purposes, accommodation and public uses, with the presence of secondary buildings as a less important feature. Small constructions are mostly associated to houses, while medium size buildings are suitable for accommodation and c&a, and the big ones are left for production and public uses. On the other hand, big open areas are always preferable with a minor relevance for c&a only. Height and floor load are assigned expected values, as for the site quality & features.

The most prone to deal with building preservation issues is the public sector, while such limitations are quite negligible for the open area. The construction's flexibility in general is well appreciated, whereas variation of the built asset within the plot is not essential, nevertheless it shows a preference for demolition rather than new construction.

Weights that in the previous table are highlighted with grey colour were not directly included in the questionnaire, but were defined on the basis of average opinions expressed by the VOC_B participants for the subset of features, or in a few cases, in reference to their comments that were adjusted in accordance with the researcher's opinion and the other values within the set. In particular, examining the "position & accessibility" set of features, it was assumed that residential use does not have a particular position preference (urban rather than suburban, etc.), but depends on local road accessibility (strong preference for smaller, urban roads): therefore, local accessibility was assigned a weight equal to 0,80; position got 0,70 and major infrastructures obtained 0,53; production prefers major infrastructure connections (0,87), followed by position (0,70) and local accessibility (0,60); the same ranking is adopted for accommodation with a smaller difference between the first two features; c&a depends on both position and local accessibility (both 0,90) and much less on major infrastructure presence (0,56); and, likewise, public activities prefer the local accessibility (0,75), then position (0,70) and major infrastructures as last (0,48). In the building efficiency group, the size of the subject (preferably small or medium) is very important to residential use (highest weight within the subset); production and public uses depend on both volume size and floor load, whereas accommodation and c&a are looking for adequate size and indoor height.

Finally, only for the "type of zone" and the "visibility" features weights were collected from the VOC_A questionnaire results, because the answers were provided by explicitly comparing the two features, whereas the VOC_B respondents were considering only visibility in general terms.

II.3 SUS_A: Sustainability Model – Part A

Approach and Questionnaire Composition

The evaluation approach adopted for the first part of the sustainability model is the method of edges, described in the chapter 3.3.1. In this case the components to evaluate were separated, so that each professional figure was answering to its specific subject/study area in addition to the three sustainability macro-categories in common:

PROFILE	ASSESSMENT AREA
architects	SOCIO-CULTURAL SUSTAINABILITY and sub-components (table 2.1)* THREE SUSTAINABILITY MACRO-CATEGORIES (table 4)*
urbanists/environmentalists	ENVIRONMENTAL SUSTAINABILITY and sub-components (table 2.2)* THREE SUSTAINABILITY MACRO-CATEGORIES (table 4)*
economists	ECONOMIC SUSTAINABILITY and sub-components (table 2.3 and 3)* THREE SUSTAINABILITY MACRO-CATEGORIES (table 4)*
public administrators	THREE SUSTAINABILITY MACRO-CATEGORIES (table 4)*

* see complete questionnaire SUS_A (A_II.3)

Altogether, there were 16 participants, 8 Slovene and 8 Italian, with an equal distribution among the selected profiles.

In each SUS_A questionnaire the aims and the approach are presented first, followed by the personal profile section and the assessment tables with the assigned parameters. The participants were asked to provide a 0-100 evaluation of the importance of each sustainability parameter[144] and of each possible combination of parameters belonging to the same grouping.

Final weights have been defined on the basis of an arithmetical mean, normalised on a scale 0-1.

Results and Discussion

SOCIO-CULTURAL SUSTAINABILITY		
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED
1) PROCESS QUALITY	*high performing project management, based on public participation and choices, that promote a good project and construction quality and facilitate future maintenance*	0,325
2) CULTURAL HERITAGE	*"heritage-friendly" approach that tries to combine regulatory compliance with design solutions that are respectful of the original asset's character (not invasive, reversible, compatible and recognisable)*	0,413
3) USER COMFORT & PERCEPTION	*attention to design choices that guarantee users' comfort and pleasant perception of the environment*	0,263
1) + 2)	-	0,775
1) + 3)	-	0,563
2) + 3)	-	0,625

Looking at the data collected, all respondents have put “cultural heritage” first, followed by the “user comfort & perception” for Slovene participants, whereas Italians consider the “process quality” as important as the first. Among possible combination the most performing is the pair “process quality” and “cultural heritage”, which is confirmed by the average weight obtained, but whose result is minor than the sum of its single components. This sub-additive/redundancy effect, present in 2/3 cases, was probably caused by the assignment of “high”

[144] Parameters from the Category level of the sustainability tree are here considered, the economic parameters from the aspect level and the three macro-categories.

values to single parameter. Indeed, only the pair composed by the cultural heritage and the user comfort & perception was awarded with some extra-points.

ENVIRONMENTAL SUSTAINABILITY		
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED
1) ENERGY EFFICIENCY	*energy efficient plan, that reduces primary energy demand and takes advantage of solar supplies*	0,425
2) ECOLOGICAL IMPACT	*reduction of the project's impact on the environment through the adoption of green technologies and materials, pollution reduction and a rational management of the construction site*	0,400
3) ENVIRONMENTAL QUALITY	*enhancement of the environmental quality through the improvement of external green areas, by supporting eco-mobility and accessibility and avoiding negative impacts on local context*	0,310
1) + 2)	-	0,800
1) + 3)	-	0,738
2) + 3)	-	0,600

Here the respondents provided different answers (prioritisation); however all of them preferred the first two parameters, putting both first in 50% of all cases. On the other hand, pair assessments almost confirm the value obtained by the contribution of single components, although some sub-additive effects can be observed here as well.

ECONOMIC SUSTAINABILITY		
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED
1) LCC	*verification of cost coverage through cash-flow analysis applied to life cycle costing (LCC) and expected incomes*	0,288
2) PROFITABILITY	*market analysis to verify market viability (or marketability): considers potential demand and competitors, occupancy level in the area and cost/rent affordability*	0,375
3) RISK	*risk/sensibility analysis to consider riskiness as well as value trend in time (value stability or increase)*	0,263
4) UTILITY	*cost-benefit analysis to evaluate indirect benefits on context (economic benefits for local community, new activities, increase of adjacent property values, etc.)*	0,275
1) + 2)	-	0,550
1) + 3)	-	0,500
1) + 4)	-	0,500
2) + 3)	-	0,550
2) + 4)	-	0,525
3) + 4)	-	0,425
1) + 2) + 3)	-	0,813
2) + 3) + 4)	-	0,763
1) + 3) + 4)	-	0,750
1) + 2) + 4)	-	0,825

Answers given by economists were not unanimous: each participant has provided a different list of priorities; nevertheless, more frequently were placed first profitability (40%) and utility (40%, once assessed first with LCC), followed by life cycle costing (LCC 20%) and never the risk factor. Even more complicated is the comparison at the second position, where answers are completely divergent. As a consequence of the diverse scores and priorities provided, the final ranking of parameters sees the highest weight assigned to the profitability, then to LCC, utility and risk.

An analysis of the assessment of pairs shows some extra-points assigned to the combination of profitability and risk (50% of respondents) and to LCC and risk (25%); other possibilities register values equal to a simple addition of the single components or a sub-addition, due to previous high evaluations. However, judgements

oscillate between 40 and 70 on a 100 base, leading to a final weight of approximately 0,50-0,55. Similarly, the evaluation of the combinations of three parameters varies from 70/100 to 95/100, putting first the group without risk, secondly the one excluding utility, third the one omitting LCC and last the group composed of LCC, risk and utility – confirming the incidence of the profitability factor in economic sustainability.

THREE SUSTAINABILITY MACRO-CATEGORIES		
PARAMETER COMBINATION	*DESCRIPTION*	AVERAGE WEIGHT ASSIGNED
1) SOCIO-CULTURAL SUSTAINABILITY	*sustainability domain concerning active preservation of cultural heritage through the definition of a user/public-centric project, able to answer public needs, to respect people's values and opinions, guarantee certain comfort and quality levels in addition to the respect for building and site identity*	0,361
2) ENVIRONMENTAL SUSTAINABILITY	*sustainability domain focusing on energy efficiency, environmental quality and low ecological impact*	0,313
3) ECONOMIC SUSTAINABILITY	*sustainability domain that controls financial feasibility (LCC, profit, risk) and socio-economic sustainability (indirect / external benefits)*	0,311
1) + 2)	-	0,644
1) + 3)	-	0,710
2) + 3)	-	0,647

According to the results (not summarised) socio-cultural sustainability was put first 8/16 times, economic sustainability 7/16 (including once first with socio-cultural s.) and environmental sustainability 4/16. 45% of Slovene participants chose economic sustainability first, followed by socio-cultural sustainability (33%) and environmental (22%). Italians put first socio-cultural sustainability (50%), economic sustainability second (30%, twice first with socio-cultural s.) and environmental sustainability last (20%).

Filtering the data by profile, architects are prone to socio-cultural sustainability in 75% cases and once equally to economic and environmental sustainability; second place was mostly assigned to environmental sustainability and economic as last. Urbanists' and environmentalists' priority was given to environmental sustainability in 50% of all cases, 25% to socio-cultural and the other 25% to economic macro-category. The latter two are both second in general, with a slight preference for the first. Economists provided varied answers: socio-cultural and economic sustainability often occupy first position (40% + 40%); however, due to a diverse distribution of priorities, no difference was noticed between socio-cultural and environmental sustainability that are both often placed second.

Average weights show quite similar results: there is a certain propensity for socio-cultural sustainability, while the other two domains are almost equally important. The most appreciated combination is the socio-cultural and economic one with a synergetic effect of +38. It is followed by the environmental and economic pair with +23 extra points and the socio-cultural and environmental combination that registers a redundancy of -30.

II.4 SUS_B: Sustainability Model – Part B

Approach and Questionnaire Composition

Weights of the parameters from phase three (sustainability analysis) – and therefore, the importance of specific sustainability issues involved in the re-use of built heritage – have been defined by means of a survey that involved professionals, who are dealing with architecture from different points of view, i.e.: architects, landscape architects, urban planners, engineers, economists, art historians, sociologists. The respondents were coming from different countries, but mainly from Italy, Croatia and Slovenia. This is due to the fact that the questionnaire was first submitted at the HERU (Heritage Urbanism) conference in Zagreb on the 22nd and 23rd October 2015, where most of the participants were, of course, living in Croatia. The survey was then conducted

a second time, between November 2015 and January 2016, when the questionnaire was sent by email only to Slovenian and Italian professionals[145].

The questionnaire has been set up in three parts: following a brief introduction explaining the survey's scope there is the previously described "personal profile" with a self assessment of the level of acquaintance with the sustainability issues in architecture. The second part, titled "Assessment of Sustainability Parameters", evaluates the impact/influence on a re-use project of each parameter from the "options & alternatives" level of the sustainability tree. The interviewee had to choose a value between 0 and 4, respectively from "uninfluential" to "greatly influencing", or "ND" – meaning "non definable" – in case of uncertainty.

The third and last part (hereinafter: prioritisation of aspects) considers the priority of parameters and is applied to a higher level of the sustainability tree that is the "aspect" level[146].The respondent had to choose 10 parameters from the list and write their ranking in order of importance.

Since the survey was carried out in two different ways, it was also conducted with different forms: at the conference in Zagreb the participants received a short version of the questionnaire, containing only the personal profile and the prioritisation from part three, whereas the file that was emailed was complete.

Data processing

Answers from part two have been summed according to the following table of equivalency:

VALUE ASSIGNED BY RESPONDENTS	*LEVEL OF INFLUENCE*	EQUIVALENT POINTS
4	*great/exceptional*	5
3	*much*	4
2	*some*	3
1	*little*	2
0	*not at all*	1
ND	*non defineable / don't know*	0

The total sum was then compared with the maximum achievable[147] and turned into a percentage, or better a weight factor between 0 and 1.

The assessment results from the prioritisation part were initially processed all together, considering both groups of respondents (short and long version answers). The total amount of respondents is 49, including an inconsistent questionnaire that was therefore overlooked. Six other cases do not follow the instructions provided, so that their ranking is not reliable, but at least the choice of the ten most important parameters was considered and each selection was here turned into an extra point*. In order to get the total scores, the following formula was applied:

$$\sum_{i=1}^{10} = m \cdot i + n \cdot x$$

where:

i = ranking position turned into a value according to: 1st = 10 points, 2nd = 9 points, (...), 10th = 1 point.
m = number of times when the position was assigned
x = selection of the parameter without assigning a priority position equal to 1 point*
n = number of times when the parameter was chosen without position specification

[145] The mail was sent directly to them or it was forwarded by the Association of Engineers and Architects.
[146] The "aspect" level is just above the "options & alternatives" level and is grouping parameters assessed in part two of the questionnaire.
[147] In this case the maximum achievable is 120 point, as calculated by: number of respondents (24) per maximum score (5).

The final ranking of all parameters was easily defined by the decreasing number of the points obtained. However, since the group answering the complete questionnaire might have got a different interpretation of the parameters due to the presence of the more specific, second part, the data collected were analysed separately as well.

In addition to this, a third ranking was deduced from phase two. Single parameter scores (options & alternative level) belonging to the same group (element from aspect level) were summed and compared again with the maximum achievable. Finally the result was calculated into a percentage as follows:

$$\frac{\sum_{i=1}^{n} = S_i \cdot 100}{120 \cdot n}$$

where:

S_i = is the total score of the parameter from the options & alternative level, calculated as described before
n= is the number of parameters from the same group (aspect element)

Results

Part 1: Personal Profile of Respondents

		HERU	E-MAIL	TOTAL
NUMBER OF RESPONDENTS		25	24	49
SEX	F	14 (56%)	13 (54,2%)	27 (55,1%)
	M	11 (44%)	11 (45,8%)	22 (44,9%)
COUNTRY	ITA	6	18	24
	SLO	-	4	4
	HR	17	2	19
	other[1]	2	-	2
AGE	<25 yrs	4	1	5
	26-35	11	7	18
	36-45	1	6	7
	46-59	6	7	13
	over 60	3	3	6
JOB	architect/engineer	5	14 (2)*	19 (2)*
	professor/researcher	14	9 (2)*	23 (2)*
	student	4	1	5
	other[2]	2	2	4
EDUCATION LEVEL	Bachelor's degree	5	1	6
	Master's degree	9	13	22
	PhD	11	9	20
STUDY AREA	Arch./Rest./Cons.	8	14 (12/2)	22 (44,9%)
	Landscape Architecture	7	1	8 (16,3%)
	Urbanism	6	1	7 (14,3%)
	Engineering	-	4	4 (8,2%)
	Sociology	1	1	2 (4,1%)
	Economics	-	2	2 (4,1%)
	Art History	-	1	1 (2,0%)
	N.D.	3	-	3 (6,1%)
INFO ON SUSTAINABILITY	4	9	10	19 (38,8%)
	3	12	7	19 (38,8%)
	2	4	6	10 (20,4%)
	1	-	-	0 (0,0%)
	0	-	1	1 (2,0%)

[1] Sweden
[2] Journalist, conservation consultant, art historian.
* Persons that are both freelance professionals and professors/researchers (double count).

Part 2: Assessment of Sustainability Parameters

	CATEGORY	ASPECT	OPTIONS & ALTERNATIVES	SCORE (S_i) / 120 pts (max)
SOCIO-CULT. SUST.	PROCESS QUALITY	COMMUNITY ENGAGEMENT & VALUES	public involvement in the decision process	93
			fulfilment of current needs	95
			respect for people's values	90
			increase of values (future potential beliefs & rituals)	95
			heritage awareness	86
		PUBLIC USE & BENEFIT	public use and usability of covered areas	96
			public use and usability of external areas	97
			socialisation facilities	93
			employment	88
			social purpose / mission	95
		PROJECT & CONSTRUCTION QUALITY	townscape & landscape	97
			design innovation	79
			construction quality assurance	87
		MAINTETNANCE & MANAGEMENT	documentation for facility management (handbooks/guidelines)	90
			EMS documentation (targets, policy, future improvement)	85
			maintenance ease and accessibility (systems)	95
	CULTURAL HERITAGE	SAFETY & REGULATORY COMPLIANCE	accessibility	94
			acoustic safety	83
			fire resistance	92
			hygiene & health requirements	86
			structural & earthquake-resistance standards	100
		LOW INVASIVITY	layout type	93
			structures	86
			finishing & decorative elements	89
			technical systems	92
		REVERSIBILITY & ADAPTABILITY	structures	96
			finishing & protection	101
			interior partition	85
			decorative elements	78
			technical systems	93
		MATERIAL COMPATIBILITY	structures	95
			interior partition	89
			finishing & protection	91
			decorative elements	81
		RECOGNISABILITY	new elements (structure/partition)	94
			gap filling / reconstructions (dec.el.)	86
	USER COMFORT &PERCEPTION	INDOOR COMFORT	hygrothermal comfort	100
			indoor air quality	100
			acoustic quality / comfort / privacy	96
			visual comfort	98
			electromagnetic comfort	84
			water quality	98
		PERCEPTUAL QUALITY	indoor design quality	97
			exterior views from inside (perceptual comfort)	90
			visual privacy	85
			personal safety (perception)	101
			exterior spaces	98
ENVIRONMENTAL S.	ENERGY EFFICIENCY	ENERGY CONSUMPTION	energy consumption monitoring (metering)	90
			primary energy demand reduction	93
			thermal insulation of the building envelope	94
		SOLAR (WIND) SHADING	natural barrier	93
			architectural elements	90
		ADVANTAGES FROM SOLAR SUPPLY	passive components	87
			thermal inertia	93
			optimisation of natural lighting / orientation / daylight use	101
		TECHNICAL SYSTEM EFFICIENCY	energy production from renewable resources	81
			distribution	84
			emission (energy efficient systems)	84
			control / regulation / ease of use	84
			presence of regenerators	**70**
		RATIONAL USE OF WATER SUPPLIES	reduction of water amount for external use	79
			reduction of water amount for other uses	76

ENVIRONMENTAL S.	ECOLOGICAL IMPACT	GREEN TECHNOLOGIES & MATERIALS	reuse of existing building material & finishing	96
			certification of origin & low embodied energy building materials or low toxicity	87
			bio-based or recycled material or future reuse and recyclability	78
			local origin / transport	99
			durability & maintenance (+ cleaning)	**105**
		LOW HEAT ISLAND EFFECT	roofing	78
			external paving	70
		LOW ACOUSTIC POLLUTION	indoor to outdoor noise limitation	77
			plant/system noise limitation	87
		LOW LUMINOUS POLLUTION	automatic lighting systems	78
			external limitations	80
		WASTE OPTIMISATION	waste management (reduction, recyclability, energy production...)	89
	ENVIRONMENTAL QUALITY	IMPROVEMENT OF EXTERNAL GREEN AREAS	reclamation of degraded areas	99
			historical or local rearrangement / protection / biodiversity	94
			hanging garden / green roof	73
			ground permeability	91
			provision and quality of walkways for pedestrian use	97
		TRANSPORT FACILITIES	public transport	97
			bicycle facilities	92
			parking facilities	90
		IMPACT ON NEIGHBOURHOOD	impact on daylight/solar energy potential of adjacent property	87
			impact of building user population on public transport (peak)	88
			impact of building user population on local road capacity	92
	CONSTRUCTION SITE MANAGEMENT	RESOURCE USAGE	water	85
			energy	90
			ground	84
		POLLUTION REDUCTION	luminous pollution	77
			acoustic pollution	82
			low dust	85
			soil and water contamination	90
		WASTE OPTIMISATION	waste management	82
		IMPACT ON NEIGHBOURHOOD	impact on local viability, residents and commercial facilities	90
ECONOMIC S.	FINANCIAL SUSTAINABILITY	FINANCEABILITY	self-financing	90
			public subsidies or tax breaks	96
			private investments	93
		COST ENGINEERING	investment cost	96
			global operating cost	95
			loan cost	79
			rate returns	85
	FINANCIAL FEASIBILITY	MARKETABILITY	potential demand	97
			present competitors	90
			occupancy level	89
		PROFITABILITY	cost/rent affordability	96
	SOCIO-ECONOMIC FEASIBILITY	DEGREE OF UTILITY		96
		EXTERNAL / INDIRECT BENEFITS	economic benefits from project on local community	100
			spread of new economic activities / impact on local economy	97
			increase of economic value of adjacent properties	93
	RISKINESS	RISK		101
		SENSIBILITY		100
		VALUE STABILITY		103

Part 3: Prioritisation of Aspects

	CATEGORY	ASPECT	HERU RESULTS		E-MAIL RESULTS		TOTAL RESULTS		FROM 2nd PART	
			pts	rank	pts	rank	pts	rank	%	rank
SOCIO-CULT. SUST.	PROCESS QUALITY	COMMUNITY ENGAGEMENT & VALUES	103	1	77	4	180	2	76,50	12
		PUBLIC USE & BENEFIT	90	3	77	4	168	3	78,17	7
		PROJECT & CONSTRUCTION QUALITY	99	2	109	1	208	1	73,06	12
		MAINTETNANCE & MANAGEMENT	85	4	54	7	139	5	75,00	17
	CULTURAL HERITAGE	SAFETY & REGULATORY COMPLIANCE	12	22	26	17	38	21	75,83	14
		LOW INVASIVITY	17	21	30	16	47	19	75,00	17
		REVERSIBILITY & ADAPTABILITY	49	8	81	3	130	6	75,50	16
		MATERIAL COMPATIBILITY	33	14	50	9	83	11	74,17	18
		RECOGNISABILITY	53	7	35	13	88	10	75,00	17
	USER COMFORT & PERCEPTION	INDOOR COMFORT	39	11	38	12	77	13	80,00	5
		PERCEPTUAL QUALITY	41	10	24	18	65	16	78,50	6
ENVIRONMENTAL S.	ENERGY EFFICIENCY	ENERGY CONSUMPTION	67	5	83	2	150	4	76,94	10
		SOLAR (WIND) SHADING	28	16	31	15	59	17	76,25	13
		ADVANTAGES FROM SOLAR SUPPLY	33	14	14	21	47	19	78,06	8
		TECHNICAL SYSTEM EFFICIENCY	37	12	75	5	112	7	67,17	24
		RATIONAL USE OF WATER SUPPLIES	25	18	7	24	32	22	64,58	26
	ECOLOGICAL IMPACT	GREEN TECHNOLOGIES & MATERIALS	63	6	39	11	102	9	77,50	9
		LOW HEAT ISLAND EFFECT	18	20	0	26	18	26	61,67	27
		LOW ACOUSTIC POLLUTION	1	25	5	25	6	29	68,33	23
		LOW LUMINOUS POLLUTION	0	26	0	26	0	30	65,83	25
		WASTE OPTIMISATION	26	17	23	19	49	18	74,17	18
	ENVIRONMENTAL QUALITY	IMPROVEMENT OF EXTERNAL GREEN AREAS	47	9	32	14	79	12	75,67	15
		TRANSPORT FACILITIES	23	19	56	6	79	12	77,50	9
		IMPACT ON NEIGHBOURHOOD	36	13	8	23	44	20	74,17	18
	CONSTRUCTION SITE MANAGEMENT	RESOURCE USAGE							71,94	21
		POLLUTION REDUCTION							69,58	22
		WASTE OPTIMISATION							68,33	23
		IMPACT ON NEIGHBOURHOOD							75,00	17
ECONOMIC S.	FINANCIAL SUSTAINABILITY	FINANCEABILITY	18	20	51	8	69	15	77,50	9
		COST ENGINEERING	7	24	23	19	30	23	73,96	19
	FINANCIAL FEASIBILITY	MARKETABILITY	10	23	5	25	15	27	77,50	9
		PROFITABILITY	7	24	14	21	21	24	76,67	11
	SOCIO-ECONOMIC FEASIBILITY	DEGREE OF UTILITY	47	9	56	6	103	8	80,00	5
		EXTERNAL / INDIRECT BENEFITS	31	15	45	10	76	14	80,56	4
	RISKINESS	RISK	7	24	7	24	14	28	84,17	2
		SENSIBILITY	10	23	11	22	21	24	83,33	3
		VALUE STABILITY	1	25	19	20	20	25	85,33	1

Discussion

Participants

Total participants were 49, half deriving from the Heru conference and half answering the complete questionnaire. Among the latter, there was a case of inconsistency in the third part of the questionnaire that was therefore not considered in the prioritisation statistics. In general, more than half of the respondents were female (55%), whereas most of the answers came from Italy (49%), followed by Croatians[148] (38,8%), Slovenians (8,2%) and Swedes (4%). Most of them are aged 26-35 or 46-59 and are working as freelance professionals (architects, engineers) or professors and researchers, which is also in accordance with their education level: almost all professors are PhD and half of the researchers have already finished their doctoral research (the others are probably currently involved in it); 76,5% of freelance professionals have got a Master Degree, whereas the rest of them continued their studies with a PhD. Predictably, all students are younger than 25 and accomplished the Bachelor degree. Finally, among the "other" workers, ¾ have a Master degree and only one of them stopped at the Bachelor level.

Almost half of the interviewees have studied architecture, restoration or conservation, followed by a second group of urbanists (14,3%) and landscape architects (16,3). Engineering covers 8,2%, whereas a few cases represent economics, sociology and art history.

At the Heru meeting, most of the people stated that they were well acquainted with sustainability issues, on the contrary, e-mail respondents felt more confident, so that 42% chose "very well acquainted". In general, it turned out that the participants are well informed on the subject.

Parameter Influence on Sustainability

Results from part two do not show greater difference among parameters involved in sustainability. Scores vary from 70/120 to 105/120, with the lowest obtained by the "low heat island effect of external paving" and the top performing "durability and maintenance of green technologies and materials". Only 9,8% of parameters reached over 100 points, 50% ranges from 90 to 99, 28,6% achieved between 80 and 89 points, whereas the remaining 11,6% was below 80.

Fewer points were assigned to the issues regarding "rational use of water supplies", "heat island effect" and "acoustic pollution". All of them belong to the environmental sustainability macro-category, so that, unexpectedly, the ecological domain seems to be the less important among the three pillars of sustainability. On the other hand, this is probably a consequence of the fact that sustainability has been seen for decades merely as an environmental problem. On the contrary, the increased sensitivity to the economic sphere – with the greatest concentration of high scores – could probably be affected by the current financial crisis, or simply because it was in the last part of a long assessment grid.

Anyway, the aim of this part of the questionnaire was not only the definition of weights for the evaluation model, but was also to simplify the structure of criteria by excluding those that would obtain a low scoring. However, output homogeneity suggests that all parameters are important and none can indeed be excluded, so the structure was rather reorganised.

Prioritisation of Sustainability Goals (aspects)

As mentioned in the previous section, the third part of the questionnaire was processed in four different ways: a first series of results was provided by the HERU participants, the second one derived from the complete-questionnaire respondents (emailed version), the third one refers to all submitted answers (first and second

[148] As was said before, the high participation of Croatians is linked to the Heru conference that was held in Zagreb.

group together) and the last is deduced from the scores obtained in part two by the second group of interviewees.

Interestingly, ranking of priority was diverse, not only among people, but also among the four groups of results. HERU participants, for instance, privilege first aspects, so that the first four entries are the most important. The second sample has a more distributed ranking, although the first position is assigned to the third aspect, whereas the previous two are fourth *ex aequo*. Ranked second there is energy consumption, followed by the "reversibility and adaptability" of cultural heritage. Total results reconfirm the first three aspects as the most urgent, with the "project & construction quality" leading. Again, energy consumption is ranked fourth, combining the second position of the second group and the fifth from the HERU sample. Next there is "maintenance & management", that was fourth (HERU) and seventh (e-mail), whereas "reversibility & adaptability" are overall sixth. Despite the different ranking, the choice of the first six aspects is confirmed in all three groups, where these factors were chosen in the top ten list.

On the contrary, the outcome from the fourth group is totally in contrast: the first five aspects are from the economic part, starting with the "value stability" and continuing ascending the list. Neither are the top ten selected aspects in accordance with the previously defined aspects. This anomaly might be explained again with the loss of attention due to the long questionnaire (results are in fact derived from part two). On the other hand, it is difficult to state which of the groups is inconsistent: given a situation where parameters seem all equally important, HERU participants might have chosen the most important in order of appearance. Moreover, despite the greater level of information obtained by the second group, these people might have not provided an accurate evaluation.

Further Analysis of the Relation between Respondents' Profile and Prioritisation of Sustainability Aspects

Collected data was analysed further to verify whether there is any relation between the answers from the prioritisation part and the respondents' profile that could explain the differences in the previous processing mode. Therefore all the answers have been examined separately with the following grouping:

	PROPERTY	A VS. B		N° A / B
1	COUNTRY	Italian	non Italian	23 / 25
2	AGE	≤ 35 yrs	> 35 yrs	23 / 25
3	JOB	academic (professors, researchers, students)	freelance professionals	28 / 20
4	STUDY AREA	architecture/restoration/conservation/ landscape architecture/urbanism	engineering, sociology, economics, art and architectural history	34 / 10

The respondents were divided into two groups according to their affinity and pursuing an equal distribution when possible. In order to rank the priorities avoiding repetitive results, several outputs have been considered. An initial ranking was provided by the sum of judgements (hereafter: S)[149]; in case of two or more recurring results an additional comparison was carried out considering respectively:

1) the preferences of those participants who had not filled the questionnaire properly[150];
2) the relative assessment, calculated dividing the previous sum S with the number of people that chose that parameter;
3) the relative assessment of the whole group, determined by dividing S with the total number of people from the group.

[149] see par. Data processing in II.4.
[150] Six respondents did choose their top-10 parameters, but did not rank them.

PARAMETER	COUNTRY		AGE		JOB		STUDY	
	ITA	NON ITA	≤35	>35	ACAD.	PROFES.	ARCH/ L.A.	OTHER
COMMUNITY ENGAGEMENT	12	1	6	1	2	2	3	1
PUBLIC USE	4	2	3	3	3	3	2	5
PROJECT QUALITY	2	3	1	2	1	1	1	3
MAINT & MAN	3	8	4	5	8	5	6	2
REGULATIONS	18	29	24	22	31	14	24	15
INVASIVITY	14	25	23	*17*	18	*22*	20	14
REVERSIBILITY	5	7	12	4	4	8	5	4
MAT COMPAT	6	16	9	14	13	13	11	17
RECOGNISABILITY	*15*	9	17	7	10	12	8	*29*
INDOOR COMFORT	7	19	11	15	22	6	15	6
PERCEPTUAL QUAL	24	10	14	16	16	19	13	21
ENERGY CONS	1	11	2	6	6	4	4	11
SOLAR SHADING	8	27	16	*17*	23	9	17	*29*
SOLAR SUPPLY	20	21	21	20	21	18	22	27
TECH EFFICIENCY	9	6	5	11	7	11	10	8
WATER USE	25	20	25	24	19	25	23	*29*
GREEN TECH & MAT	19	4	8	9	5	21	9	13
HEAT ISLAND	21	*32*	26	30	25	32	26	*29*
ACOUSTIC POLL	31	31	32	31	32	27	32	23
LUMINOUS POLL	33	*32*	33	33	33	33	33	*29*
WASTE OPT	29	15	15	25	15	*29*	18	21
EXT GREEN AREAS	10	14	7	19	12	15	12	18
TRANSPORT	11	13	13	13	11	17	16	12
IMPACT NEIGH	22	18	19	23	17	*29*	21	20
FINANCEABILITY	13	17	20	12	20	7	19	7
COST ENGIN	23	*23*	28	21	27	20	29	16
MARKETABILITY	30	28	31	*27*	*29*	28	31	27
PROFITABILITY	28	*23*	27	*27*	*29*	*22*	30	24
DEGREE OF UTILITY	*15*	5	10	8	9	10	7	10
INDIR BENEFITS	17	12	18	10	14	16	14	9
RISK	26	30	30	29	28	26	28	25
SENSIBILITY	32	22	22	32	24	31	25	26
VALUE STAB	27	26	29	26	26	24	27	19

The table shows the ranking of parameters for the different groups of respondents. If two or more parameters reached the same position, their rank is written in italic.

Discussion

In general, results are rather homogeneous despite the filtered processing, confirming in the first three positions the project quality, followed by the public usability of spaces and the community engagement. From the forth position on, the data provides divergent opinions that meet again on the less important issues, which are from the less urgent: luminous pollution, acoustic pollution and marketability, followed by other economic aspects or problems related to pollution and resource usage.

The fact that, besides degree of utility and indirect benefits, all the other economic issues received a low prioritisation suggests that respondents are generally socio-cultural sustainability supporters, who, according to Rosato and Rotaris, behave like Public Administration rather than private investors, whose aim is usually to maximise their profit (Rosato & Rotaris, 2006).

However, a greater difference can be noticed between Italians and non-Italians: the most important aspect for Italian people seems to be Energy consumption, which is in 11th place for the other group, vice versa, Community engagement is only 12th for Italians. Other dissimilarities, with a gap of more than 10 positions, concern: Regulatory compliance (Ita: 18 vs. Non-Ita: 29), Invasivity (14 vs. 25), Material Compatibility (6 vs. 16), Indoor comfort (7 vs. 19), Perceptual quality (24 vs. 10), Solar shading (8 vs. 27), Green technologies & materials (19 vs. 4) and Waste optimisation (29 vs. 15).

Age comparison does not provide significant differences except for Recognisability (U35: 17 vs. O35: 7), Waste optimisation (15 vs. 25) and Improvement of external green areas (7 vs. 19). Moreover, Community engagement (6 vs. 1), Reversibility (12 vs. 4), Energy consumption (2 vs. 6) and Technical efficiency (5 vs. 11) are slightly discordant.

On the contrary, the job-based analysis has many more similarities as well as some totally opposing opinions: academics and freelance professionals totally agree on the most important topics, but have a completely different perception about Regulations (31 vs. 14), Indoor comfort (22 vs. 6), Solar shading (23 vs. 9), Green technologies & materials (5 vs. 21), Waste optimisation (15 vs. 29), Impact on neighbourhood (17 vs. 29) and Financeability (20 vs. 7).

As last, the architects' first five priorities are about the same as those of the other group, excluding Energy consumption (4 vs. 11). Also in this case there are some disagreement with regard to Regulation (24 vs. 15), Recognisability (8 vs. 29), Perceptual quality (13 vs. 21), Solar shading (17 vs. 29), Financeability (19 vs. 7) and Cost engineering (29 vs. 16).

Determination of Weights from the Prioritisation of Aspects

Weights of sustainability parameters from aspect level have been derived from their prioritisation – total results (see: II.4: Results Part 3) – through the application of the Simos method, which is able to convert a ranking of preferences (cardinal number) into a normalised weight (ordinal number). The method of cards proposed by Simos [151] in 1990 is considered an effective tool for weight assessment in the field of multi-criteria decision aid due to its easy approach, suitable for non expert DM (Figueira & Roy, 2002; Siskos & Tsotsolas, 2015).

In this case, the ranking list obtained by all contributors (total results) was examined according to the category-grouping of aspects. Considering the ranking gap between the aspects of each group, the value of the blank card was determined – equal to 1 or 2 [152] - so that the difference between the final weights was smaller.

[151] The Simos method is composed of three steps: '1) the DM is given a set of cards with the name of one criterion on each (*n* cards, each corresponding to a specific criterion of a family *F*). A number of white cards are also provided to the DM; 2) the DM is asked to rank the cards/criteria from the least (position 1) to the most important (position n); 3) the DM is finally asked to introduce white cards between two successive cards if she/he deems that the difference between them is more extensive. The greater the difference between the criteria, the greater the number of white cards between them. Specifically, if *u* denotes the difference in the value between two successive criteria cards, then one white card means a difference of *two times u*, two white cards mean a difference of *three times u*, etc.' The analyst calculates the 'non-normalised weight of each rank by dividing the sum of positions of a rank by the total number of criteria belonging to it. The non-normalised weights are then divided by the total sum of positions of the criteria in each rank (excluding white cards) to obtain normalised weights.' (Siskos & Tsotsolas, 2015, p. 544)

[152] See number in brackets next to "blank card" in the table. Value 1 was preferable, but the difference between the positions of certain subset of criteria was too big and, as a consequence, the gap between the weights considerable. In order to avoid turning certain criteria into ininfluential parameters, the gap was reduced by assuming the value of blank cards equal to 2.

CATEGORY (GROUP)	ASPECT	rank from total results	position[1]	weight
PROCESS QUALITY	project & construction quality	1	5	**0,3846** (5/13)
	community engagement & values	2	4	**0,3077** (4/13)
	public use & benefit	3	3	**0,2308** (3/13)
	-	*1 blank card (1)*	*2*	-
	maintenance & management	5	1	**0,0769** (1/13)
CULTURAL HERITAGE	reversibility & adaptability	6	12	**0,3636** (12/33)
	-	*2 blank cards (2)*	*11, 10*	-
	recognisability	10	9	**0,2727** (9/33)
	material compatibility	11	8	**0,2424** (8/33)
	-	*4 blank cards (2)*	*7, 6, 5, 4*	-
	low invasivity	19	3	**0,0910** (3/33)
	-	*1 blank card (2)*	*2*	-
	safety & regulatory compliance	21	1	**0,0303** (1/33)
USER COMFORT & PERCEPTION	indoor comfort	13	4	**0,8000** (4/5)
	-	*2 blank cards (1)*	*3, 2*	-
	perceptual quality	16	1	**0,2000** (1/5)
ENERGY EFFICIENCY	energy consumption	5/6*	8	**0,8889** (8/9)
	-	*6 blank cards (2)*	*7 - 2*	-
	solar optimisation	18*	1	**0,1111** (1/9)
ECOLOGICAL IMPACT	green technologies & materials	9	11	**0,6875** (11/16)
	-	*6 blank cards (2)*	*10 - 5*	-
	construction site management	21/22*	4	**0,2500** (4/16)
	-	*2 blank cards (2)*	*3, 2*	-
	pollution reduction	26/27*	1	**0,0625** (1/16)
ENVIRONMENTAL QUALITY	improvement of external green areas	12	6	**0,4615** (6/13)
	transport facilities	12	6	**0,4615** (6/13)
	-	*4blank cards (2)*	*5 - 2*	-
	impact on neighbourhood	20	1	**0,0770** (1/13)
LCC COVERAGE	financeability	15	6	**0,8571** (6/7)
	-	*4 blank cards (2)*	*5 - 2*	-
	operating cost coverage (cost engineering)	23	1	**0,1429** (1/7)

[1]Reverse order: from least to most important.
* Ranking was summarised through weighted summation.

The economic sustainability was greatly rearranged after the first survey, so that the results obtained through Heru and e-mail had to be discarded. Moreover, most of the respondents were designers, whereas the updated version of the questionnaire (SUS_A for economists) was submitted to economists only, providing, arguably, more realistic outputs. Comparing both results, financeability is still more important than operating cost coverage, however the difference between the two lowers down to 0,597 for financeability and 0,403 for the operating cost coverage (former “cost engineering”) in the economists’ evaluation.

A_II.1 – VOC_A Questionnaire

QUESTIONNAIRE FOR THE DEFINITION OF WEIGHTS

IN THE VOCATIONALITY MODEL

The aim of this questionnaire is to evaluate **the importance of certain features** for the following groups of uses:

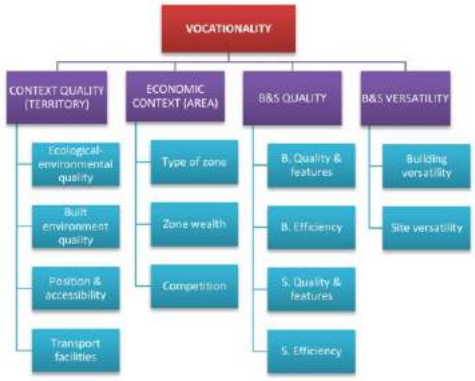
- **RES** **RESIDENTIAL**: houses, apartments etc.
- **PRO** **PRODUCTION:** small factories, craftsmanship, distribution and logistic activities
- **ACC** **ACCOMMODATION**: hotels, B&B, hostels, hall of residence etc
- **C&A** **COMMERCIAL & ADMINISTRATION**: public or private offices and retail
- **PUB** **PUBLIC:** cultural, educational, sport services

The questionnaire is anonymous and it will be used to define the **weights of an evaluation model**, whose aim is to show the **most compatible new function (vocationality)**, given a building and its site with certain features.

The features are grouped according to the different extent of territory they refer to:

- CONTEXT QUALITY – TERRITORY (region and city)
- ECONOMIC CONTEXT – AREA (neighbourhood)
- BUILDING & SITE (construction and its plot, close surroundings of the building)

Since the adopted evaluation model will consider also interactions among criteria, the respondent will be asked to give an opinion on each combination of criteria belonging to the same level (see scheme below).



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1 PERSONAL PROFILE

Country:

Age: ☐ <25 ☐ 26-35 ☐ 36-45 ☐ 46-59 ☐ >60

Sex: ☐F ☐M

Job:

Education degree and study area:

Do you have any experience/knowledge in defining (new) uses for buildings or areas?
(Choose a number from *0=none* to *4 = a lot*) ☐0 ☐1 ☐2 ☐3 ☐4

---

2 WEIGHT DEFINITION OF VOCATIONALITY FEATURES

Please, evaluate the following scenarios, defined by different combinations of criteria answering the following question:

EXAMPLE

Imagine an abandoned architecture with its site (plot) in Gorizia // Nova Gorica, where (see combination:) the feature X is optimal (fully satisfied) and the others at their worst (not satisfied), how much much do you think such combination would influence the choice of use A, B, C, D or E, on a scale of 0-100 (POOR = 0, EXCELLENT = 100)?

FEATURE X	FEATURE Y	FEATURE Z	USE				
description	*description*	*description*	*A*	*B*	*C*	*D*	*E*
OPTIMAL	*POOR*	*POOR*	*50*	*25*	*34*	*?*	*?*

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CONTEXT QUALITY (TERRITORY)				USE				
ECOLOGICAL-ENVIRONMENTAL Q.	**BUILT ENVIRONMENT QUALITY**	**POSITION & ACCESSIBILITY**	**TRANSPORT FACILITIES**	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
includes panoramic views, presence of natural sites and parks in a healthy environment	*presence of wine & food trails, facilities proximity (sport, education, commercial etc.); (cultural-historic cities/sites or trails)*	*the object is situated in the most suitable location (urban-suburban) for the considered use and is well serviced with local and /or major infrastructures*	*the object is in an area well serviced by public transport and bicycle or walking trails*	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100
POOR	***POOR***	***POOR***	***POOR***	***0***	***0***	***0***	***0***	***0***
OPTIMAL	***POOR***	***POOR***	***POOR***					
POOR	***OPTIMAL***	***POOR***	***POOR***					
POOR	***POOR***	***OPTIMAL***	***POOR***					
POOR	***POOR***	***POOR***	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***POOR***	***POOR***					
OPTIMAL	***POOR***	***OPTIMAL***	***POOR***					
OPTIMAL	***POOR***	***POOR***	***OPTIMAL***					
POOR	***OPTIMAL***	***OPTIMAL***	***POOR***					
POOR	***OPTIMAL***	***POOR***	***OPTIMAL***					
POOR	***POOR***	***OPTIMAL***	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***OPTIMAL***	***POOR***					
POOR	***OPTIMAL***	***OPTIMAL***	***OPTIMAL***					
OPTIMAL	***POOR***	***OPTIMAL***	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***POOR***	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***OPTIMAL***	***OPTIMAL***	***100***	***100***	***100***	***100***	***100***

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ECONOMIC CONTEXT (AREA)		USE				
LOCATION – ZONE TYPE	**VISIBILITY**	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
the object is situated in the most suitable zone in reference to the urban plan (residential, production, touristic etc.)	*building's potential to be seen due to strategic position or context set-up (ex.: not hidden by trees, other buildings etc.)*	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100
POOR	***POOR***	***0***	***0***	***0***	***0***	***0***
OPTIMAL	***POOR***					
POOR	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***100***	***100***	***100***	***100***	***100***

BUILDING & SITE VERSATILITY		USE				
BUILDING VERSATILITY	**SITE VERSATILITY**	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
the building is well-disposed to change (few limitations, high layout flexibility, space fractionability, distribution variation, service adaptability, raising or enlargement possibilities)	*the site is well-disposed to change (is not protected, can be rearranged; can modify its built asset (new construction or demolition of existing secondary buildings))*	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100
POOR	***POOR***	***0***	***0***	***0***	***0***	***0***
OPTIMAL	***POOR***					
POOR	***OPTIMAL***					
OPTIMAL	***OPTIMAL***	***100***	***100***	***100***	***100***	***100***

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BUILDING AND SITE QUALITY				USE				
BUILDING QUALITY & FEATURES	**BUILDING EFFICIENCY**	**SITE QUALITY & FEATURES**	**SITE EFFICIENCY**	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
the building has a special appeal and features or a historic character, secondary buildings are also available	*available size/volume, height and floor load are compatible with the considered use*	*the site is amenous and rich in biodiversity with some special features, has low risks and pollution*	*the plot has an appropriate size for the considered use*	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100
POOR	*POOR*	*POOR*	*POOR*	***0***	***0***	***0***	***0***	***0***
OPTIMAL	*POOR*	*POOR*	*POOR*					
POOR	*OPTIMAL*	*POOR*	*POOR*					
POOR	*POOR*	*OPTIMAL*	*POOR*					
POOR	*POOR*	*POOR*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*POOR*	*POOR*					
OPTIMAL	*POOR*	*OPTIMAL*	*POOR*					
OPTIMAL	*POOR*	*POOR*	*OPTIMAL*					
POOR	*OPTIMAL*	*OPTIMAL*	*POOR*					
POOR	*OPTIMAL*	*POOR*	*OPTIMAL*					
POOR	*POOR*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*OPTIMAL*	*POOR*					
POOR	*OPTIMAL*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*POOR*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*POOR*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*OPTIMAL*	*OPTIMAL*	***100***	***100***	***100***	***100***	***100***

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3 WEIGHT DEFINITION OF VOCATIONALITY MACRO-FEATURES

Similarly to the previous part, for each use define the importance of the following associations of vocationality macro-features.

VOCATIONALITY				USE				
CONTEXT QUALITY	**ECONOMIC CONTEXT**	**B&S QUALITY**	**B&S VERSATILITY**	**RES**	**PRO**	**ACC**	**C&A**	**PUB**
good quality of the ecological and built environment, good position, accessibility and transport facilities	*appropriate zone type and visibility*	*building and site are efficient and provided with good qualities and features*	*building and site are highly flexible and modifiable*	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100	EVAL. 0 – 100
POOR	*POOR*	*POOR*	*POOR*	***0***	***0***	***0***	***0***	***0***
OPTIMAL	*POOR*	*POOR*	*POOR*					
POOR	*OPTIMAL*	*POOR*	*POOR*					
POOR	*POOR*	*OPTIMAL*	*POOR*					
POOR	*POOR*	*POOR*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*POOR*	*POOR*					
OPTIMAL	*POOR*	*OPTIMAL*	*POOR*					
OPTIMAL	*POOR*	*POOR*	*OPTIMAL*					
POOR	*OPTIMAL*	*OPTIMAL*	*POOR*					
POOR	*OPTIMAL*	*POOR*	*OPTIMAL*					
POOR	*POOR*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*OPTIMAL*	*POOR*					
POOR	*OPTIMAL*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*POOR*	*OPTIMAL*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*POOR*	*OPTIMAL*					
OPTIMAL	*OPTIMAL*	*OPTIMAL*	*OPTIMAL*	***100***	***100***	***100***	***100***	***100***

---------- *End of questionnaire. Thank you for your kind cooperation!* ----------

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A_II.2 – VOC_B Questionnaire

QUESTIONNAIRE FOR THE ASSESSMENT OF THE RELATION BETWEEN FEATURES AND VOCATIONALITY OF A BUILDING AND ITS SITE

The aim of this questionnaire is to evaluate **the impact of certain features** on the choice of a **new compatible function** for the building and its site (plot), or better on its **vocationality**.

The following groups of uses will be considered:

- **RES** **RESIDENTIAL**: houses, apartments etc.
- **PRO** **PRODUCTION**: small factories, craftsmanship, distribution and logistic activities
- **ACC** **ACCOMMODATION**: hotels, B&B, hostels, hall of residence etc
- **C&A** **COMMERCIAL & ADMINISTRATION**: public or private offices and retail
- **PUB** **PUBLIC**: cultural, educational, sport services

The questionnaire is anonymous and it will be used to define the weights of an evaluation model, the aim of which is to assist designers and decision makers during the planning of a re-use project.

---

1 PERSONAL PROFILE

Country:

Age: ☐ <25 ☐ 26-35 ☐ 36-45 ☐ 46-59 ☐ >60

Sex: ☐F ☐M

Job:

Education degree and study area:

Do you have any experience/knowledge in defining (new) uses for buildings or areas?
(Choose a number from *0=none* to *4 = a lot*) ☐0 ☐1 ☐2 ☐3 ☐4

---

2 IMPACT OF FEATURES ON VOCATIONALITY

Please, fill the following evaluation table by saying, **how the considered feature affects** (impact on) **the choice of each use**: residential / production / accommodation / commercial & administration / public?

+	+3	definitely positive
	+2	quite positive
	+1	slighlty positive
	0	ininfluential
-	-1	slightly negative
	-2	quite negative
	-3	definitely negative

A	B	C	description	E/F	RES	PRO	ACC	C&A	PUB
CONTEXT QUALITY (territory)	ECOLOGICAL-ENVIRONM. QUALITY	LANDSCAPE QUALITY	panoramic views (also on built environment)						
		NATURAL AMENITIES	presence of gardens, parks, natural reserves etc.						
		HEALTH	low polluted context, especially in reference to good quality of air						
	BUILT ENVIRONMENT QUALITY (presence of...)	WINE & FOOD TRAILS	vicinity to wine & food itineraries COLLIO ,S. Floriano/BRDA						
		FACILITY PROXIMITY presence of a certain type of service within the range of ca. 2 km	presence of restaurants, cafes or other food services	gastronomy					
			presence of kindergartens, schools (various levels), libraries etc.	education facilities					
			presence of public offices and post	public administration					
			presence of hospitals or other healthcare services	medical provision					
			presence of municipal gardens, parks, equipped places, courts, gyms etc.	sport & leisure facilities					
			presence of shops, supermarkets, banks and other services	service providers / retail commercial facilities					
	POSITION & ACCESSIBILITY (AREA)	POSITION	building position (and area vitality) in reference to its town/city of belonging, assuming that city centre is lively and suburban area is calm	URBAN CENTRE c.so Italia, P.zza Vittoria; Bevkov trg, Občina, center Šempetra					
				CITY/TOWN EDGE Piuma, Montesanto, Straccis / OBI, Pristava... Vrtojba					
				SUBURBAN S. Andrea, Piedimonte, Lucinico/ Solkan, Kromberk.					
		LOCAL ACCESSIBILITY	type of infrastructure that leads to the site (predominant)	COUNTY ROAD (REGIONAL) Mainizza, Via Trieste, Via III Armata / NG-Šempeter, Kromberk >70 km/h					
				URBAN/LOCAL ROAD 50 km/h					
		MAJOR INFRASTRUCTURES	proximity of major infrastructure nodes	HIGHWAY EXIT WITHIN 2 KM RANGE					
				RAILWAY STATION WITHIN 1 KM RANGE CIP/FS					
	TRANSPORT FACILITIES	PUBLIC TRANSPORT	the nearest bus/tram stop is within 500 m range	BUS STOP PROXIMITY <300m					
			high frequency is considered an average waiting time <15'	BUS FREQUENCY <15' urban frequency					
		BICYCLE & WALKING	vicinity to walkways and/or bicycle pathways – <500 m						
ECONOMIC CONTEXT (area)	LOCATION	TYPE OF ZONE	zoning class according to town plan or dominant type of service/buildings in the area	RESIDENTIAL					
				PRODUCTION					
				TOURISTIC / GASTRONOMIC centre Go + Collio					
				ADMINISTRATIVE/COMMERCIAL					
				AGRICULTURAL					
		VISIBILITY	building potential to be seen due to strategic position or context set-up	non nascosta da alberi, etc...es. Villa Ritter/Frommer					

A	B	C	description	E/F	RES	PRO	ACC	C&A	PUB
BUILDING & SITE QUALITY	B. QUALITY & FEATURES	APPEAL/HISTORIC CHARACTER	aesthetic appraisal and relevance of the building; building appeal, attractiveness						
		SECONDARY BUILDINGS	presence of accessory buildings	edifici accessori					
		SPECIAL FEATURES	presence of special elements like balconies, terraces, swimming pools, views, garages etc.						
	B. EFFICIENCY	VOLUME SIZE	dimensional characteristics of the building small/medium/big	SMALL (<500 mc)					
				MEDIUM (500-3000 mc)					
				BIG (>3000 mc)					
		HEIGHT <3m	indoor available height is up to 3,00 m						
		FLOOR LOAD	max floor load is > 300 kg/sqm						
	SITE QUALITY & FEATURES	AMENITY/BIODIVERSITY	biodiversity, ecosystems (river, trees etc.), historical arrangement etc.						
		SAFETY & HEALTH	low danger of natural hazards (floods) or unhealthy/annoying environment (noise, visual, soil contamination etc.)						
		FEATURES	recreational areas, children playground etc.						
	SITE EFFICIENCY	AREA SIZE	availability of small, medium or big open-space area in reference to the covered area	SMALL(>75%) – 3/4					
				MEDIUM (50-150%) ½ - 1,5x					
				BIG (>200%) 2x					
B&S VERSATILITY	BUILDING VERSATILITY	TRANSFORMATION VS. LIMITATION limitations to building modification due to heritage prescriptions	preservation of exterior finishing and appearance	PRESERVATION OF THE EXTERIOR					
			preservation of interior finishing and appearance	PRESERVATION OF THE INTERIOR					
			obligation to maintain or adopt certain construction methods (historic, local, similar to existing etc.)	BUILDING TECHNIQUES					
			obligation to maintain certain elements (e.g. machinery, art pieces etc.) in their location	PRESERVATION OF SPECIFIC ELEMENTS					
		INTERIOR SPACE FRACTIONABILITY	possibility of new space configurations (limitations from strictness of the plant scheme (load-bearing structure) are acceptable)	free plan					
		DISTRIBUTION VARIATION & INDEPENDENT UNITS	possibility to change connections and paths in the building and to divide the building in two or more independent units						
		SERVICE ADAPTABILITY	modifiability of current plants and service systems (HVAC and other)						
		OPPORTUNITIES	possibility of construction raising, enlargement or new construction in adherence	CONSTRUCTION RAISING					
	SITE VERSATILITY	TRANSFORMATION VS. LIMITATION	obligation to safeguard animals and their habitat that are present in the site or to maintain landscape and environmental quality (no alteration) or specific vegetation species	ANIMAL /LANDSCAPE PROTECTION AREA					
			obligation to maintain certain elements in the open-space (e.g.: wells, fountain, statues etc.)	PRESERVATION OF SPECIFIC ELEMENTS					
		BUILT ASSET VARIATION	possibility to construct new buildings on the same site	NEW BUILDING CONSTRUCTION					
			possibility to demolish some/all existing secondary buildings	DEMOLITION OF SECONDARY BUILDINGS					

End of questionnaire. Thank you for your kind cooperation!

QUESTIONNAIRE FOR THE ASSESSMENT OF SUSTAINBILITY ISSUES IN THE PROCESS OF BUILDING RE-USE

The aim of this questionnaire is to evaluate the **importance of sustainability issues** involved in the **re-use** of built heritage (legally protected or not), as perceived by professionals. Furthermore, the data provided will be used to define the **weights of an evaluation model**, the aim of which is to assist designers and decision makers during the planning of a re-use project.

As a case of multi-criteria-decision problem, the adopted evaluation model will be grounded on the multi-linear operator that has the advantage of considering also interactions among criteria. Therefore, the respondent will be asked to give an opinion on each combination of criteria belonging to the same level (see scheme below).

The questionnaire is anonymous and all information provided will be treated for study purposes only and disclosed in aggregated form.

1 PERSONAL PROFILE

Country:

Age:

Sex: ☐F ☐M

Job:

Education degree (please specify study area):

How much do you feel acquainted with sustainability issues in architecture?
(Choose a number from *0=not at all* to *4 = a lot*) ☐0 ☐1 ☐2 ☐3 ☐4

2 WEIGHT DEFINITION OF SUSTAINABILITY ISSUES

Please, evaluate the following scenarios, defined by different combinations of criteria answering the following question:

EXAMPLE

On a scale of 0-100 (POOR = 0, EXCELLENT = 100), how would you assess the following situation, where the criterion X is optimal (fully satisfied) and the others at their worst (not satisfied)? etc.

CRITERION X	CRITERION Y	CRITERION Z
description	*description*	*description*
OPTIMAL	***POOR***	***POOR***

2.1	SOCIO CULTURAL SUSTAINABILITY		
PROCESS QUALITY	**CULTURAL HERITAGE**	**USER COMFORT & PERCEPTION**	**EVAL. 0 – 100**
high performing project management, based on public participation and choices, that promote a good project and construction quality and facilitate future maintenance	*"heritage-friendly" approach that tries to combine normative application with design solutions that are respectful of the original asset's character (not invasive, reversible, compatible and recognisable)*	*attention to design choices that guarantee users' comfort and pleasant perceiving of the environment*	
POOR	***POOR***	***POOR***	***0***
OPTIMAL	***POOR***	***POOR***	
POOR	***OPTIMAL***	***POOR***	
POOR	***POOR***	***OPTIMAL***	
OPTIMAL	***OPTIMAL***	***POOR***	
OPTIMAL	***POOR***	***OPTIMAL***	
POOR	***OPTIMAL***	***OPTIMAL***	
OPTIMAL	***OPTIMAL***	***OPTIMAL***	***100***

2.2	ENVIRONMENTAL SUSTAINABILITY		EVAL. 0 – 100
ENERGY EFFICIENCY	**ECOLOGICAL IMPACT**	**ENVIRONMENTAL QUALITY**	
energy efficient plan, that reduces primary energy demand and takes advantage of solar supplies	*reduction of the project impact on the environment through the adoption of green technologies and materials, pollution reduction and a rational management of the construction site*	*improvement of the environmental quality through the valorisation of external green areas, by supporting eco-mobility and accessibility and avoiding negative impacts on local context*	
POOR	POOR	POOR	0
OPTIMAL	POOR	POOR	
POOR	OPTIMAL	POOR	
POOR	POOR	OPTIMAL	
OPTIMAL	OPTIMAL	POOR	
OPTIMAL	POOR	OPTIMAL	
POOR	OPTIMAL	OPTIMAL	
OPTIMAL	OPTIMAL	OPTIMAL	100

2.3	ECONOMIC SUSTAINABILITY			EVAL. 0 – 100
LCC COVERAGE	**PROFITABILITY**	**RISK**	**UTILITY**	
verification of cost coverage through cash-flow analysis applied to life cycle costing (LCC) and expected incomes	*market analysis to verify market viability (or marketability): considers potential demand and competitors, occupancy level in the area and cost/rent affordability*	*risk/sensibility analysis to consider riskiness as well as value trend in time (value stability or increase)*	*cost-benefit analysis to evaluate indirect benefits on context (economic benefits for local community, new activities, increase of adjacent property values etc.)*	
POOR	POOR	POOR	POOR	0
OPTIMAL	POOR	POOR	POOR	
POOR	OPTIMAL	POOR	POOR	
POOR	POOR	OPTIMAL	POOR	
POOR	POOR	POOR	OPTIMAL	
OPTIMAL	OPTIMAL	POOR	POOR	
OPTIMAL	POOR	OPTIMAL	POOR	
OPTIMAL	POOR	POOR	OPTIMAL	
POOR	OPTIMAL	OPTIMAL	POOR	
POOR	OPTIMAL	POOR	OPTIMAL	
POOR	POOR	OPTIMAL	OPTIMAL	
OPTIMAL	OPTIMAL	OPTIMAL	POOR	
POOR	OPTIMAL	OPTIMAL	OPTIMAL	
OPTIMAL	POOR	OPTIMAL	OPTIMAL	
OPTIMAL	OPTIMAL	POOR	OPTIMAL	
OPTIMAL	OPTIMAL	OPTIMAL	OPTIMAL	100

3 WEIGHT DEFINITION OF ECONOMIC PARAMETERS

On a scale of 0 – 100 how would you rate (separately – no interaction) the following sub-criteria of the LCC Covering parameter?

CRITERION	SUB-CRITERION	*DESCRIPTION*	*EVAL. 0-100*
LCC COVERAGE	FINANCEABILITY	*initial cost covering: considers demolition/reclamation, purchase, transformation cost (construction, professional, license, loan, marketing costs and developer profit) vs. autofinancing opportunities, public subsidies or tax breaks and private investments*	
	OPERATING COST **COVERAGE**	*covering of operating and management + maintenance cost [+ demolition (end of life)]*	

4 WEIGHT DEFINITION OF THE THREE SUSTAINABILITY DOMAINS

Similarly to the previous part, define the importance of the following associations of sustainability macro-categories.

SUSTAINABILITY			EVAL. 0 – 100
SOCIO-CULTURAL SUSTAINABILITY	**ENVIRONMENTAL SUSTAINABILITY**	**ECONOMIC SUSTAINABILITY**	
sustainability domain concerning active preservation of cultural heritage through the definition of a user/public-centric project, able to answer public needs, to respect people's values and opinions, guarantee certain comfort and quality levels in addition to the respect of building's and site's identity	*sustainability domain focusing on energetic efficiency, environmental quality and low ecological impact*	*sustainability domain that controls financial feasibility (LCC, profit, risk) and socio-economic sustainability (indirect / external benefits)*	
POOR	POOR	POOR	0
OPTIMAL	POOR	POOR	
POOR	OPTIMAL	POOR	
POOR	POOR	OPTIMAL	
OPTIMAL	OPTIMAL	POOR	
OPTIMAL	POOR	OPTIMAL	
POOR	OPTIMAL	OPTIMAL	
OPTIMAL	OPTIMAL	OPTIMAL	100

---------- *End of questionnaire. Thank you for your kind cooperation!* ----------

Should you have any recommendations or comments, please write them in the space below:

Insert comments here.

A_II.4 – SUS_B Complete Questionnaire

QUESTIONNAIRE FOR THE ASSESSMENT OF SUSTAINBILITY ISSUES IN THE PROCESS OF BUILDING RE-USE

The aim of this questionnaire is to evaluate the importance of specific sustainability issues involved in the re-use of built heritage, as perceived by professionals (or not) coming from different countries. The questionnaire is anonymous and all information provided will be treated for study purposes only and disclosed in aggregated form.

1 PERSONAL PROFILE

Country: Insert text here.

Age: Insert text here.

Sex: ☐F ☐M

Job: Insert text here.

Education degree (please specify study area): Insert text here.

How much do you feel acquainted with sustainability issues in architecture?
(Choose a number from 0=not at all to 4 = a lot) ☐0 ☐1 ☐2 ☐3 ☐4

2 ASSESSMENT OF SUSTAINABILITY PARAMETERS

Q: How much do you think the parameter influences the SUSTAINABILITY of the re-use project?

Please, answer the upper question for each parameter from the "options & alternatives" column by putting a cross in the assessment column according to the following evaluation table:

0	1	2	3	4	ND
Not at all	Little	Some	Much	Great/Exceptional	I don't know

Choose only one option per line.

MACRO CAT	CATEGORY	ASPECT	OPTIONS & ALTERNATIVES	ASSESSMENT					
				0	1	2	3	4	ND
SOCIO-CULTURAL SUST.	PROCESS QUALITY	COMMUNITY ENGAGEMENT & VALUES	public involvement in the decision process	☐	☐	☐	☐	☐	☐
			fulfilment of current needs	☐	☐	☐	☐	☐	☐
			respect for people's values	☐	☐	☐	☐	☐	☐
			increase of values (future potential beliefs & rituals)	☐	☐	☐	☐	☐	☐
			increase of heritage awareness	☐	☐	☐	☐	☐	☐

MACRO CAT	CATEGORY	ASPECT	OPTIONS & ALTERNATIVES	ASSESSMENT					
				0	1	2	3	4	ND
SOCIO-CULTURAL SUST.		PUBLIC USE & BENEFIT	public use and usability of covered areas	☐	☐	☐	☐	☐	☐
			public use and usability of external areas	☐	☐	☐	☐	☐	☐
			socialisation facilities	☐	☐	☐	☐	☐	☐
			increase of employment possibilities	☐	☐	☐	☐	☐	☐
			social purpose / mission of the project	☐	☐	☐	☐	☐	☐
		PROJECT & CONSTRUCTION QUALITY	townscape & landscape quality	☐	☐	☐	☐	☐	☐
			design innovation *(innovative solutions)*	☐	☐	☐	☐	☐	☐
			construction quality assurance *(quality certification)*	☐	☐	☐	☐	☐	☐
		MAINTETNANCE & MANAGEMENT	provision of documentation for facility management *(handbooks/guidelines)*	☐	☐	☐	☐	☐	☐
			provision of EMS documentation *(set of potential targets, policy, future possible improvements)*	☐	☐	☐	☐	☐	☐
			maintenance ease and accessibility *(technical systems)*	☐	☐	☐	☐	☐	☐
	CULTURAL HERITAGE	SAFETY & REGULATORY COMPLIANCE	accessibility *(inclusive design)*	☐	☐	☐	☐	☐	☐
			acoustic safety *(accordance with acoustic normative standards)*	☐	☐	☐	☐	☐	☐
			fire resistance	☐	☐	☐	☐	☐	☐
			hygiene & health r. *(dimensional standards and facilities)*	☐	☐	☐	☐	☐	☐
			structural & **earthquake resistance**	☐	☐	☐	☐	☐	☐
		LOW INVASIVITY *reduced impact (minimum modifications) on specified element:*	**layout type**	☐	☐	☐	☐	☐	☐
			structures	☐	☐	☐	☐	☐	☐
			finishing & decorative elements	☐	☐	☐	☐	☐	☐
			technical systems	☐	☐	☐	☐	☐	☐
		REVERSIBILITY & ADAPTABILITY *possibility of returning to a previous condition with minor implications (cost, loss of orig. material etc.) and/or adaptability to change in the future*	structures	☐	☐	☐	☐	☐	☐
			finishing & protection	☐	☐	☐	☐	☐	☐
			interior partition	☐	☐	☐	☐	☐	☐
			decorative elements	☐	☐	☐	☐	☐	☐
			technical systems	☐	☐	☐	☐	☐	☐
		MATERIAL COMPATIBILITY *physical, chemical, aesthetic appropriateness of used materials in:*	structures	☐	☐	☐	☐	☐	☐
			interior partition	☐	☐	☐	☐	☐	☐
			finishing & protection	☐	☐	☐	☐	☐	☐
			decorative elements	☐	☐	☐	☐	☐	☐
		RECOGNISABILITY *distinction between new and original components*	new elements (structure/partition)	☐	☐	☐	☐	☐	☐
			gap filling / reconstructions (of decorative el.)	☐	☐	☐	☐	☐	☐
	USER COMFORT & PERCEIVING	INDOOR COMFORT	hygrothermal comfort	☐	☐	☐	☐	☐	☐
			indoor air quality	☐	☐	☐	☐	☐	☐
			acoustic quality / comfort / privacy	☐	☐	☐	☐	☐	☐
			visual comfort	☐	☐	☐	☐	☐	☐
			electromagnetic comfort	☐	☐	☐	☐	☐	☐
			water quality	☐	☐	☐	☐	☐	☐
		PERCEPTUAL QUALITY	indoor design quality	☐	☐	☐	☐	☐	☐
			exterior views from inside (perceptual comfort)	☐	☐	☐	☐	☐	☐
			visual privacy *(from outsiders or passersby)*	☐	☐	☐	☐	☐	☐

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MACRO CAT	CATEGORY	ASPECT	OPTIONS & ALTERNATIVES	ASSESSMENT					
				0	1	2	3	4	ND
			personal safety *(perceiving a safe environment)*	☐	☐	☐	☐	☐	☐
			exterior spaces *(outdoor comfort)*	☐	☐	☐	☐	☐	☐
ENVIRONMENTAL S.	ENERGY EFFICIENCY	ENERGY CONSUMPTION	energy consumption monitoring *(metering)*	☐	☐	☐	☐	☐	☐
			primary energy demand reduction	☐	☐	☐	☐	☐	☐
			thermal insulation of the building envelope	☐	☐	☐	☐	☐	☐
		SOLAR (WIND) SHADING	natural barrier *(e.g.: use of trees for shading)*	☐	☐	☐	☐	☐	☐
			architectural elements *(protection with)*	☐	☐	☐	☐	☐	☐
		ADVANTAGES FROM SOLAR SUPPLY	passive components *(heat collectors)*	☐	☐	☐	☐	☐	☐
			thermal inertia *(good thermal phase shifting)*	☐	☐	☐	☐	☐	☐
			optimisation of natural lighting / orientation / daylight use	☐	☐	☐	☐	☐	☐
		TECHNICAL SYSTEM EFFICIENCY	energy production from renewable resources	☐	☐	☐	☐	☐	☐
			efficient distribution	☐	☐	☐	☐	☐	☐
			emission *(energy efficient systems)*	☐	☐	☐	☐	☐	☐
			control / regulation / ease of use	☐	☐	☐	☐	☐	☐
			presence of regenerators	☐	☐	☐	☐	☐	☐
		RATIONAL USE OF WATER SUPPLIES	reduction of water amount for external use	☐	☐	☐	☐	☐	☐
			reduction of water amount for other uses	☐	☐	☐	☐	☐	☐
	ECOLOGICAL IMPACT	GREEN TECHNOLOGIES & MATERIALS	reuse of existing building material & finishing	☐	☐	☐	☐	☐	☐
			certification of origin & low embodied energy building materials or low toxicity	☐	☐	☐	☐	☐	☐
			bio-based or recycled material or future reuse and recyclability	☐	☐	☐	☐	☐	☐
			local origin / transport	☐	☐	☐	☐	☐	☐
			durability & maintenance (+ cleaning)	☐	☐	☐	☐	☐	☐
		LOW HEAT ISLAND EFFECT	roofing	☐	☐	☐	☐	☐	☐
			external paving	☐	☐	☐	☐	☐	☐
		LOW ACOUSTIC POLLUTION	indoor to outdoor noise limitation	☐	☐	☐	☐	☐	☐
			plant/system noise limitation	☐	☐	☐	☐	☐	☐
		LOW LUMINOUS POLLUTION	automatic lighting systems	☐	☐	☐	☐	☐	☐
			external limitations	☐	☐	☐	☐	☐	☐
		WASTE OPTIMISATION	waste management *(reduction, recyclability, energy production...)*	☐	☐	☐	☐	☐	☐
ENVIRONMENTAL S.	ENVIRONMENTAL QUALITY	IMPROVEMENT OF EXTERNAL GREEN AREAS	reclamation of degraded areas	☐	☐	☐	☐	☐	☐
			historical or local rearrangement / protection / biodiversity	☐	☐	☐	☐	☐	☐
			hanging garden / green roof	☐	☐	☐	☐	☐	☐
			ground permeability	☐	☐	☐	☐	☐	☐
			provision and quality of walkways for pedestrian use	☐	☐	☐	☐	☐	☐
		TRANSPORT FACILITIES	public transport *(availability /connection)*	☐	☐	☐	☐	☐	☐
			bicycle facilities	☐	☐	☐	☐	☐	☐
			parking facilities	☐	☐	☐	☐	☐	☐
		IMPACT ON NEIGHBOURHOOD	impact on daylight/solar energy potential of adjacent property	☐	☐	☐	☐	☐	☐

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VOC normalised weights - upper levels of the vocationality tree

Light coloured cells put in evidence weights that were defined indirectly, considering the answers provided for sub features and comments or opinions expressed during the interviews.

	RES	PRO	ACC	C&A	PUB	1st LEVEL	RES	PRO	ACC	C&A	PUB	2nd LEVEL	RES	PRO	ACC	C&A	PUB	3rd LEVEL
VOCATIONALITY	0,316	0,219	0,303	0,275	0,284	CONTEXT QUALITY (territory)	0,256	0,109	0,288	0,144	0,172	ECOLOGICAL-ENVIRONMENTAL Q.	0,330	0,161	0,330	0,241	0,255	LANDSCAPE QUALITY
													0,330	0,166	0,316	0,227	0,297	NATURAL AMENITIES
													0,340	0,206	0,311	0,264	0,320	HEALTH
							0,269	0,166	0,241	0,216	0,200	BUILT ENVIRONMENT Q.	0,411	0,315	0,567	0,322	0,427	WINE & FOOD TRAILS
													0,504	0,385	0,433	0,432	0,450	FACILITY PROXIMITY
							0,228	0,375	0,222	0,309	0,259	POSITION & ACCESSIBILITY (AREA)	0,297	0,339	0,297	0,382	0,297	POSITION
													0,339	0,255	0,255	0,382	0,318	LOCAL ACCESSIBILITY
													0,225	0,368	0,312	0,236	0,201	MAJOR INFRASTRUCTURES
							0,219	0,266	0,203	0,234	0,263	TRANSPORT FACILITIES	0,502	0,412	0,464	0,479	0,494	PUBLIC TRANSPORT
													0,498	0,360	0,466	0,441	0,457	BICYCLE & WALKING
	0,194	0,284	0,216	0,297	0,209	ECONOMIC CONTEXT (area)	<---	<---	<---	<---	<---	LOCATION	0,790	0,639	0,558	0,545	0,652	TYPE OF ZONE
													0,194	0,326	0,416	0,455	0,313	VISIBILITY
	0,269	0,200	0,256	0,200	0,238	BUILDING & SITE QUALITY	0,288	0,122	0,306	0,300	0,281	BUILDING QUALITY & FEATURES	0,325	0,189	0,356	0,299	0,335	APPEAL/HISTORIC CHARACTER
													0,309	0,294	0,253	0,278	0,284	SECONDARY BUILDINGS
													0,366	0,189	0,366	0,240	0,258	SPECIAL FEATURES
							0,294	0,453	0,263	0,331	0,309	BUILDING EFFICIENCY	0,398	0,398	0,325	0,356	0,372	VOLUME SIZE
													0,343	0,125	0,325	0,348	0,256	HEIGHT
													0,241	0,401	0,285	0,291	0,372	FLOOR LOAD
							0,231	0,119	0,266	0,144	0,184	SITE QUALITY & FEATURES	0,320	0,147	0,330	0,214	0,292	AMENITY/BIODIVERSITY
													0,350	0,164	0,326	0,286	0,315	SAFETY & HEALTH
													0,330	0,147	0,286	0,234	0,316	FEATURES
							0,175	0,281	0,147	0,194	0,216	SITE AVAILABILITY & SIZE	<---	<---	<---	<---	<---	AREA SIZE
	0,194	0,256	0,172	0,191	0,200	B&S VERSATILITY	0,534	0,584	0,559	0,588	0,519	BUILDING VERSATILITY	0,128	0,074	0,136	0,124	0,145	TRANSFORMATION VS. LIMITATION
													0,204	0,238	0,193	0,204	0,220	INTERIOR SPACE FRACTIONABILITY
													0,227	0,216	0,217	0,217	0,214	DISTRIBUTION VARIATION & INDEPENDENT UNITS
													0,204	0,217	0,200	0,207	0,210	SERVICE ADAPTABILITY
													0,204	0,214	0,204	0,200	0,210	ENLARGEMENT OPPORTUNITIES
							0,413	0,372	0,391	0,366	0,413	SITE VERSATILITY	0,432	0,148	0,481	0,347	0,427	TRANSFORMATION VS. LIMITATION
													0,568	0,578	0,517	0,517	0,554	BUILT ASSET VARIATION

On the following page:

VOC normalised weights - lower levels of the vocationality tree

	1st LEVEL	2nd LEVEL	3rd LEVEL	RES	PRO	ACC	C&A	PUB	4th LEVEL	RES	PRO	ACC	C&A	PUB	4th LEVEL (COMPLEMENTARY FEATURES)
VOCATIONALITY	CONTEXT QUALITY (territory)	ECOLOGICAL-ENVIRONMENTAL Q.	LANDSCAPE QUALITY												
			NATURAL AMENITIES												
			HEALTH												
		BUILT ENVIRONMENT Q.	WINE & FOOD TRAILS												
			FACILITY PROXIMITY	0,141	0,139	0,183	0,160	0,160	GASTRONOMY						
				0,189	0,122	0,106	0,120	0,157	EDUCATION FACILITIES						
				0,159	0,125	0,117	0,154	0,139	PUBLIC ADMINISTRATION						
				0,168	0,128	0,146	0,123	0,139	MEDICAL PROVISION						
				0,170	0,125	0,152	0,136	0,167	SPORT & LEISURE FACILITIES						
				0,173	0,125	0,154	0,165	0,133	SERVICE PROVIDERS/RETAIL COMM. FACILITIES						
		POSITION & ACCESSIBILITY (AREA)	POSITION							0,819	0,118	0,888	0,986	0,903	URBAN CENTRE
										0,873	0,488	0,707	0,529	0,737	CITY/TOWN EDGE
										0,763	0,668	0,625	0,433	0,570	SUBURBAN
			LOCAL ACCESSIBILITY							0,382	0,738	0,639	0,500	0,428	COUNTY ROAD (REGIONAL)
										0,778	0,562	0,735	0,680	0,695	URBAN / LOCAL ROAD
			MAJOR INFRASTRUCTURES	0,194	0,528	0,400	0,313	0,225	HIGHWAY EXIT						
				0,416	0,472	0,447	0,329	0,320	RAILWAY STATION						
		TRANSPORT FACILITIES	PUBLIC TRANSPORT	0,500	0,418	0,470	0,492	0,508	BUS STOP PROXIMITY <300m						
				0,500	0,403	0,455	0,462	0,478	BUS FREQUENCY <15'						
			BICYCLE & WALKING												
	ECONOMIC CONTEXT (area)	LOCATION	TYPE OF ZONE							1,000	0,132	0,722	0,653	0,695	RESIDENTIAL
										0,063	0,958	0,118	0,348	0,172	PRODUCTION
										0,763	0,243	1,000	0,737	0,627	TOURISTIC / GASTRONOMIC
										0,543	0,543	0,557	0,986	0,723	ADMINISTRATIVE/COMMERCIAL
										0,667	0,378	0,695	0,351	0,267	AGRICULTURAL
			VISIBILITY												
	BUILDING & SITE QUALITY	BUILDING QUALITY & FEATURES	APPEAL/HISTORIC CHARACTER												
			SECONDARY BUILDINGS												
			SPECIAL FEATURES												
		BUILDING EFFICIENCY	VOLUME SIZE							0,874	0,363	0,625	0,568	0,213	*SMALL (<1000 mc)*
										0,682	0,667	0,751	0,751	0,695	*MEDIUM (1000-5000 mc)*
										0,404	0,923	0,626	0,583	0,859	*BIG (>5000 mc)*
			HEIGHT												
			FLOOR LOAD												
		SITE QUALITY & FEATURES	AMENITY/BIODIVERSITY												
			SAFETY & HEALTH												
			FEATURES												
		SITE AVAILABILITY & SIZE	AREA SIZE							0,654	0,530	0,668	0,639	0,558	*SMALL (<100%)*
										0,790	0,721	0,682	0,626	0,735	*MEDIUM (100-200%)*
										0,848	0,806	0,723	0,612	0,902	*BIG (>200%)*
	B&S VERSATILITY	BUILDING VERSATILITY	TRANSFORMATION VS. LIMITATION	0,262	0,153	0,263	0,233	0,268	PRESERVATION OF THE EXTERIOR						
				0,199	0,113	0,183	0,211	0,229	PRESERVATION OF THE INTERIOR						
				0,182	0,107	0,188	0,165	0,217	BUILDING TECHNIQUES						
				0,240	0,135	0,303	0,245	0,286	PRESERVATION OF SPECIFIC ELEMENTS						
			INTERIOR SPACE FRACTIONABILITY												
			DISTRIBUTION VARIATION & INDEPENDENT UNITS												
			SERVICE ADAPTABILITY												
			ENLARGEMENT OPPORTUNITIES												
		SITE VERSATILITY	TRANSFORMATION VS. LIMITATION	0,375	0,099	0,458	0,296	0,337	ANIMAL / LANDSCAPE PROTECTION AREA						
				0,521	0,209	0,542	0,424	0,551	PRESERVATION OF SPECIFIC ELEMENTS						
			BUILT ASSET VARIATION	0,451	0,492	0,402	0,419	0,443	NEW BUILDING CONSTRUCTION						
				0,533	0,508	0,493	0,477	0,517	DEMOLITION OF SECONDARY BUILDINGS						

A_III.2 – SUS Normalised Weights

SUSTAINABILITY	WEIGHTS	SUSTAINABILITY MACRO-CATEGORY	WEIGHTS	CATEGORY	WEIGHTS	ASPECT	WEIGHTS	OPTIONS & ALTERNATIVES
GENERAL SUSTAINABILITY LEVEL	0,361	SOCIO-CULTURAL SUSTAINABILITY	0,325	PROCESS QUALITY	0,308	COMMUNITY ENGAGEMENT & VALUES	0,252	public participation
							0,258	fulfilment of current needs
							0,244	respect for people's values
							0,246	increase of values
					0,231	PUBLIC USE & BENEFIT	0,255	public usability of covered areas
							0,258	public usability of external areas
							0,234	employment
							0,253	social purpose / mission
					0,385	PROJECT & CONSTRUCTION QUALITY	0,369	townscape & landscape
							0,300	design innovation
							0,331	construction quality
					0,077	MAINTENANCE & MANAGEMENT	0,333	documentation for facility management (handbooks/guidelines)
							0,315	EMS documentation (targets, policy, future improvement)
							0,352	maintenance ease and accessibility (systems)
			0,413	CULTURAL HERITAGE	0,364	SAFETY & REGULATORY COMPLIANCE	0,207	accessibility
							0,182	acoustic safety
							0,202	fire resistance
							0,189	hygiene & health requirements
							0,220	structural & earthquake resistance
					0,273	LOW INVASIVITY	0,258	layout type
							0,239	structures
							0,247	finishing & decorative elements
							0,256	technical systems
					0,242	REVERSIBILITY & ADAPTABILITY	0,212	structures
							0,223	finishing & protection
							0,188	interior partition
							0,172	decorative elements
							0,205	technical systems
					0,091	MATERIAL COMPATIBILITY	0,267	structures
							0,250	interior partition
							0,256	finishing & protection
							0,228	decorative elements
					0,030	RECOGNISABILITY	0,522	new elements (structure/partition)
							0,478	gap filling / reconstructions (dec.el.)
			0,263	USER COMFORT & PERCEPTION	0,800	INDOOR COMFORT	0,254	hygrothermal comfort
							0,254	indoor air quality
							0,244	acoustic quality / comfort / privacy
							0,249	visual comfort
					0,200	PERCEPTUAL QUALITY	0,361	indoor design quality
							0,328	exterior views from inside (perceptual comfort)
							0,310	visual privacy
	0,313	ENVIRONMENTAL SUSTAINABILITY	0,425	ENERGY EFFICIENCY	0,880	ENERGY CONSUMPTION	0,363	thermal insulation of the building envelope
							0,313	renewable resources
							0,324	technical system efficiency
					0,120	SOLAR OPTIMISATION	0,358	orientation
							0,319	thermal inertia and passive components
							0,324	solar and wind shading
			0,400	ECOLOGICAL IMPACT	0,692	GREEN TECHNOLOGIES & MATERIALS	0,332	reuse of existing material
							0,304	material certification
							0,363	durability & maintenance
					0,077	POLLUTION REDUCTION	0,204	low acoustic pollution
							0,197	low luminous pollution
							0,184	low heat island effect
							0,222	waste optimisation
							0,193	rational use of water supplies
					0,231	CONSTRUCTION SITE MANAGEMENT	0,253	resource usage
							0,244	pollution reduction
							0,240	waste optimisation
							0,263	impact on neighbourhood
			0,313	ENVIRONMENTAL QUALITY	0,455	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,260	reclamation of degraded areas
							0,247	historical asset and biodiversity
							0,239	ground permeability
							0,255	walkways and outdoor furniture
					0,455	TRANSPORT FACILITIES	0,348	public transport
							0,330	bicycle facilities
							0,323	parking facilities
					0,090	IMPACT ON NEIGHBOURHOOD	0,326	solar potential of adjacent property
							0,330	public transport peak
							0,345	local road capacity
	0,311	ECONOMIC SUSTAINABILITY	0,288	LCC COVERAGE	0,597	FINANCEABILITY		
					0,403	OPERATING COST COVERAGE		
			0,375	PROFITABILITY				
			0,263	RISK				
			0,275	UTILITY				

BUILDING ID (PART 1)

GENERAL INFORMATION ON THE BUILDING		
GENERAL	*NAME:*	
	CURRENT PROPERTY:	
	MANAGER AUTHORITY/SITE MANAGER:	
	TYPE:	
	STYLE:	
	YEAR/PERIOD OF CONSTRUCTION:	
	AUTHOR/DESIGNER:	
	ORIGINAL USE/FUNTION:	
	ACTUAL USE/FUNCTION:	
	CONSERVATION STATUS:	
LOCATION	*NATION:*	
	MUNICIPALITY:	
	CITY/TOWN/LOCALITY:	
	ZIP CODE:	
	ADDRESS & CIVIC No.:	
	COORDINATES:	
	ALTITUDE MSL [m]	
	CLIMATIC ZONE [DD]:	
CADASTRAL DATA	*CADASTRAL MUNICIPALITY:*	
	CADASTRAL MAP/SUBJECT No.:	
	PARCEL/CAD. UNIT:	
NUMERICAL DATA - site	*LOT AREA [m^2]:*	
	COVERED AREA [m^2]:	
	UNCOVERED AREA [m^2]:	*automatic calculation*
	BUILT AREA [m^2]:	
NUMERICAL DATA - building	*No. OF STOREYS ABOVE GROUND:*	
	No. OF STOREYS UNDERGROUND:	
	TOTAL STOREY No.:	*automatic calculation*
	PLANT AREA [m^2]:	
	AVERAGE HEIGHT [m]	
	TOTAL NET AREA [m^2]:	
	TOTAL VOLUME [m^3]:	*automatic calculation*
TOWN PLAN/LOCAL STRATEGIC PLAN	*ZONE:*	
	SPECIFICATIONS:	
	NOTES:	
PROTECTION & RESTRICTIONS:	*LEGALLY PROTECTED:*	
	REGULATORY REFERENCE:	
	FROM DATE/YEAR:	
	OTHER RESTRICTIONS:	
NOTES:	*OTHER INFORMATION:*	

BRIEF HISTORY			
PERIOD	*USE & FUNCTION*	PROPERTY	MODIFICATIONS

CONTEXT QUALITY		Building ID Part 1 (continuation)
LANDSCAPE QUALITY/FRAME	*urban context*	
	natural context	
SITE QUALITY	*character of the lot and adjacent land; historical asset; biodiversity*	
ECONOMIC CONTEXT	*historic or urban centre / commercial / touristic / business / production/industrial site / agricultural / natural and recreational context*	
AVAILABLE SERVICES	*hotel, recreation, commercial, food service etc.*	
ACCESSIBILITY	*main infrastructural connections, transport facilities*	

SOCIAL VALUE		
HERITAGE AWARENESS	*community's perception of the subject as a cultural / natural / other type of heritage*	
HISTORIC/TRADITIONAL VALUE	*association with important people / events / ideas; evidence of local / regional / national history*	
COLLECTIVE ATTACHMENT VALUE	*perceived meanings by a community in relation to political / national / cultural sentiment; source of cultural identity or emotional link derived from use*	
SPIRITUAL VALUE	*intangible values and meanings related to community beliefs, religion, spiritual practice and sentiment*	

ARCHITECTURAL QUALITY		
AESTHETIC VALUE	*visual and non visual aspects derived from compositional and attractive qualities: massing, proportions, unity and context integration, colour, texture, material, spaces and views, craftsmanship and execution quality (detailing); picturesqueness*	
	decorative elements (exterior and interior)	
STYLISTIC/TRADITIONAL VALUE	*principal characteristics of a particular class / period of style / tradition;*	
RARITY VALUE	*demonstrates uncommon / rare / endangered aspects or it is a special case*	
AUTHOR VALUE	*association with life / work of an important person / group of architects/designers*	
TYPEICAL/DESIGN VALUE	*significant plant form / planning scheme / concept; appreciation in press; awards and nominations; innovatory or derived aspects (from important examples)*	
TECHNICAL VALUE	*presence of particular materials and construction systems, technology and techniques (traditional / historic / innovative / unique)*	

PRESERVATION DIRECTIVE	
Summarise directive and restrictions from the authority in charge for the preservation of the subject.	

BUILDING ID (PART 2)

BUILDING SPECIFICATIONS - ELEMENTAL CLASSIFICATION

MAJOR GROUP ELEMENTS	*GROUP ELEMENTS*	QUANTITY / PRESENCE		DESCRIPTION	MATERIALS	CONSERVATION STATUS - DIAGNOSIS
A SUBSTRUCTURE	*A01 Foundations*	.....	ml	.....	.....	.....
	A02 Ground floor	.....	mq	.....	.....	.....
	A03 Basement walls	.....	mq	.....	.....	.....
B SUPERSTRUCTURE (load-bearing)	*B01 Frame*	.....	ml	.....	.....	.....
	B02 External Walls	.....	mq	.....	.....	.....
	B03 Internal Walls	.....	mq	.....	.....	.....
	B04 Upper floors	.....	mq	.....	.....	.....
	B05 Roof	.....	mq	.....	.....	.....
	B06 External stairs	.....	mq	.....	.....	.....
	B07 Internal stairs	.....	mq	.....	.....	.....
	B08 Projections	.....	mq	.....	.....	.....
C PARTITION & CLOSURE	*C01 Interior partitions*	.....	mq	.....	.....	.....
	C02 Internal doors	.....	No.	.....	.....	.....
	C03 External doors	.....	No.	.....	.....	.....
	C04 Windows	.....	No.	.....	.....	.....
D FINISHES	*D01 External wall finishes*	.....	mq	.....	.....	.....
	D02 Internal wall finishes	.....	mq	.....	.....	.....
	D03 Stair finishes	.....	mq	.....	.....	.....
	D04 Floor finishes	.....	mq	.....	.....	.....
	D05 Ceiling finishes	.....	mq	.....	.....	.....
	D06 Roof finishes	.....	mq	.....	.....	.....
	D07 Doorstep	.....	mq	.....	.....	.....
E DECORATIVE ELEMENTS	*E01 External wall decoration*	.....	mq	.....	.....	.....
	E02 Internal wall decoration	.....	mq	.....	.....	.....
	E03 External window and door framing	.....	ml	.....	.....	.....
	E04 Internal window and door framing	.....	ml	.....	.....	.....
	E05 Roof decoration	.....	No./ml	.....	.....	.....
	E06 Balustrade and parapets	.....	ml	.....	.....	.....
	E07 Other	.....	?	.....	.....	.....
F SERVICES & CONVEYING SYSTEMS	*F01 Drainage*	.....	Y/N	.....	.....	.....
	F02 Plumbing	.....	Y/N	.....	.....	.....
	F03 Heating	.....	Y/N	.....	.....	.....
	F04 Ventilation & A/C	.....	Y/N	.....	.....	.....
	F05 Electrical installations	.....	Y/N	.....	.....	.....
	F06 Gas installation	.....	Y/N	.....	.....	.....
	F07 Communication installation	.....	Y/N	.....	.....	.....
	F08 Lifts & Escalators	.....	Y/N	.....	.....	.....
	F09 Fire protection	.....	Y/N	.....	.....	.....
	F10 Protective installation	.....	Y/N	.....	.....	.....
G SITE EQUIPMENT	*G01 Site enclosure*	.....	ml	.....	.....	.....
	G02 Site paving (hard landscaping)	.....	mq	.....	.....	.....
	G03 Soft landscaping	.....	mq	.....	.....	.....
	G04 Site services (public utilities)	.....	Y/N	.....	.....	.....
	G05 Site buildings	.....	Y/N	.....	.....	.....
	G06 Site fittings	.....	Y/N	.....	.....	.....

Attachment V – Step TWO: Vocationality Model

A	B	RES	PRO	ACC	C&A	PUB	C	description		RES	PRO	ACC	C&A	PUB	E	F to be pre-selected (choose 1)	EVALUATION
CONTEXT QUALITY (territory)	ECOLOGICAL-ENVIRONMENTAL Q.	0,000	0,000	0,000	0,000	0,000	LANDSCAPE QUALITY	panoramic views (also on built environment)									0
		0,000	0,000	0,000	0,000	0,000	NATURAL AMENITIES	presence of gardens, parks, natural reserves etc.									0
		0,000	0,000	0,000	0,000	0,000	HEALTH	low polluted context, especially in reference to good quality of air									0
	BUILT ENVIRONMENT Q.	0,000	0,000	0,000	0,000	0,000	WINE & FOOD TRAILS	vicinity to wine & food itineraries (Collio, S. Floriano, Brda) <5' by car									0
		0,000	0,000	0,000	0,000	0,000	FACILITY PROXIMITY	presence of a certain type of service within the range of ca. 2 km	presence of restaurants, cafes or other food services	0,000	0,000	0,000	0,000	0,000	gastronomy		0
									presence of kindergartens, schools (various levels), libraries etc.	0,000	0,000	0,000	0,000	0,000	education facilities		0
									presence of public offices and post	0,000	0,000	0,000	0,000	0,000	public administration		0
									presence of hospitals or other healthcare services	0,000	0,000	0,000	0,000	0,000	medical provision		0
									presence of municipal gardens, parks, equipped places, courts, gyms etc.	0,000	0,000	0,000	0,000	0,000	sport & leisure facilities		0
									presence of shops, supermarkets, banks and other services	0,000	0,000	0,000	0,000	0,000	service providers / retail commercial facilities		0
	POSITION & ACCESSIBILITY (AREA)	ERROR	ERROR	ERROR	ERROR	ERROR	POSITION	building position (and area vitality) in reference to its town/city of belonging, assuming that city centre is lively and suburban area is calm	c.so Verdi and Italia, P.zza Vittoria; Bevkov trg, trg E. Kardelja, Šempeter;	0,000	0,000	0,000	0,000	0,000		URBAN CENTRE	0
									Piuma, Montesanto, Straccis etc.; Solkan, Rožna dolina, Vrtojba etc.	0,000	0,000	0,000	0,000	0,000		CITY/TOWN EDGE	0
									S.Andrea, Piedimonte, Lucinico; Miren, Volčja Draga, Prvačina, Šempas Ozeljan etc.	0,000	0,000	0,000	0,000	0,000		SUBURBAN	0
		ERROR	ERROR	ERROR	ERROR	ERROR	LOCAL ACCESSIBILITY	type of infrastructure that leads to the site (predominant)	>50 km/h or: Mainizza, Via Trieste, Via III Armata; Kromberška cesta, NG-Šempeter;	0,000	0,000	0,000	0,000	0,000		COUNTY ROAD (REGIONAL)	0
									<50 km/h	0,000	0,000	0,000	0,000	0,000		URBAN / LOCAL ROAD	0
		0,000	0,000	0,000	0,000	0,000	MAJOR INFRASTRUCTURES	proximity of major infrastructure nodes	highway exit within 2 km range	0,000	0,000	0,000	0,000	0,000	HIGHWAY EXIT		0
									railway station within 1 km range	0,000	0,000	0,000	0,000	0,000	RAILWAY STATION		0
	TRANSPORT FACILITIES	0,000	0,000	0,000	0,000	0,000	PUBLIC TRANSPORT	availability and efficiency of public transport in reference to proximity and frequency	the nearest bus/tram stop is within 300 m range	0,000	0,000	0,000	0,000	0,000	BUS STOP PROXIMITY <300m		0
									high frequency is considered an average waiting time <15' (urban frequency)	0,000	0,000	0,000	0,000	0,000	BUS FREQUENCY <15'		0
		0,000	0,000	0,000	0,000	0,000	BICYCLE & WALKING	vicinity to walkways and/or bicycle pathways - within 500 m									0
ECONOMIC CONTEXT (area)	LOCATION	ERROR	ERROR	ERROR	ERROR	ERROR	TYPE OF ZONE	zone type according to dominant type of service/buildings in the area		0,000	0,000	0,000	0,000	0,000		RESIDENTIAL	0
										0,000	0,000	0,000	0,000	0,000		PRODUCTION	0
										0,000	0,000	0,000	0,000	0,000		TOURISTIC / GASTRONOMIC	0
										0,000	0,000	0,000	0,000	0,000		ADMINISTRATIVE/COMMERCIAL	0
										0,000	0,000	0,000	0,000	0,000		AGRICULTURAL	0
		0,000	0,000	0,000	0,000	0,000	VISIBILITY	building potential to be seen due to strategic position or context set-up (not hidden by vegetation, trees etc.)									0
BUILDING & SITE QUALITY	BUILDING QUALITY & FEATURES	0,000	0,000	0,000	0,000	0,000	APPEAL/HISTORIC CHARACTER	aesthetic appraisal and relevance of the building; building appeal, attractiveness									0
		0,000	0,000	0,000	0,000	0,000	SECONDARY BUILDINGS	presence of accessory buildings									0
		0,000	0,000	0,000	0,000	0,000	SPECIAL FEATURES	presence of special elements like balconies, terraces, swimming pools, views etc.									0
	BUILDING EFFICIENCY	ERROR	ERROR	ERROR	ERROR	ERROR	VOLUME SIZE	dimensional characteristics of the building small/medium/big		0,000	0,000	0,000	0,000	0,000		SMALL (<1000 mc)	0
										0,000	0,000	0,000	0,000	0,000		MEDIUM (1000-5000 mc)	0
										0,000	0,000	0,000	0,000	0,000		BIG (>5000 mc)	0
		0,000	0,000	0,000	0,000	0,000	HEIGHT	indoor available height is up to 3,00 m									0
		0,000	0,000	0,000	0,000	0,000	FLOOR LOAD	max floor load is greater than 300 kg/sqm									0
	SITE AVAILABILITY & SIZE	0	0	0	0	0	AREA SIZE	availability of small, medium or big open-space area in reference to the covered area (inverse lot coverage)		0,000	0,000	0,000	0,000	0,000		SMALL (<100%)	0
										0,000	0,000	0,000	0,000	0,000		MEDIUM (100-200%)	0
										0,000	0,000	0,000	0,000	0,000		BIG (>200%)	0
	SITE QUALITY & FEATURES	0,000	0,000	0,000	0,000	0,000	AMENITY/BIODIVERSITY	biodiversity, ecosystems (streams, trees etc.), historical arrangement etc.									0
		0,000	0,000	0,000	0,000	0,000	SAFETY & HEALTH	low danger of natural hazards (floods) or unhealthy/annoying environment (noise, visual, soil contamination etc.)									0
		0,000	0,000	0,000	0,000	0,000	FEATURES	recreational areas, children playground etc									0
B&S VERSATILITY	BUILDING VERSATILITY	1,000	1,000	1,000	1,000	1,000	TRANSFORMATION VS. LIMITATION	limitations to building modification due to heritage prescriptions or urban plan	preservation of exterior finishing and appearance	0,000	0,000	0,000	0,000	0,000	PRESERVATION OF THE EXTERIOR		0
									preservation of interior finishing and appearance	0,000	0,000	0,000	0,000	0,000	PRESERVATION OF THE INTERIOR		0
									obligation to maintain or adopt certain construction methods (historic, local, similar to existing etc.)	0,000	0,000	0,000	0,000	0,000	BUILDING TECHNIQUES		0
									obligation to maintain certain elements (e.g. machinery, art pieces etc.) in their location	0,000	0,000	0,000	0,000	0,000	PRESERVATION OF SPECIFIC ELEMENTS		0
		0,000	0,000	0,000	0,000	0,000	INTERIOR SPACE FRACTIONABILITY	possibility of new space configurations (limitations from strictness of the plant scheme (load-bearing structure) are acceptable) - free plan									0
		0,000	0,000	0,000	0,000	0,000	DISTRIBUTION VARIATION & INDEPENDENT UNITS	possibility to change connections and paths in the building and to divide the building in two or more independent units									0
		0,000	0,000	0,000	0,000	0,000	SERVICE ADAPTABILITY	modifiability of current plants and service systems (HVAC and other)									0
		0,000	0,000	0,000	0,000	0,000	ENLARGEMENT OPPORTUNITIES	possibility of construction raising, enlargement or new construction in adherence									0
	SITE VERSATILITY	1,000	1,000	1,000	1,000	1,000	TRANSFORMATION VS. LIMITATION	limitations to external areas due to preservation of habitats, biodiversity, environmental quality	obligation to safeguard animals and their habitat that are present in the site or to maintain landscape and environmental quality (no alteration) or specific vegetation species	0,000	0,000	0,000	0,000	0,000	ANIMAL / LANDSCAPE PROTECTION AREA		0
									obligation to maintain certain elements in the open-space (e.g.: wells, fountain, statues etc.)	0,000	0,000	0,000	0,000	0,000	PRESERVATION OF SPECIFIC ELEMENTS		0
		0,000	0,000	0,000	0,000	0,000	BUILT ASSET VARIATION	possible operations on existing and new buildings construction	possibility to construct new buildings on the lot	0,000	0,000	0,000	0,000	0,000	NEW BUILDING CONSTRUCTION		0
									possibility to demolish some/all existing secondary buildings	0,000	0,000	0,000	0,000	0,000	DEMOLITION OF SECONDARY BUILDINGS		0

ATTACHMENT VI – STEP THREE: SUSTAINABILITY MODEL

VALUE MACRO-CATEGORY	MACRO-CATEGORY	VALUE CATEGORY	CATEGORY	VALUE ASPECT	ASPECT	V.S.W. OPTIONS & ALT.	OPTIONS & ALTERNATIVES	QUESTION	U.M.	SCORE	EVAL. INPUT	NP
								Does the project....				
0,000	SOCIO-CULT. SUST.	0,000	PROCESS QUALITY	0,000	COMMUNITY ENGAGEMENT & VALUES	0,000	public participation	allow public involvement in the decision process?	Y / P / N	1 / 0,5 / 0		
						0,000	fulfilment of current needs	satisfy current needs of the community?	marks_A	1/0,75/0,50/0,25/0		
						0,000	respect for people's values	respect existing values associated to the B/S?	marks_A	1/0,75/0,50/0,25/0		
						0,000	increase of values	promote new values (future potential beliefs & rituals) for the B/S or increase heritage awareness/perception of the the B/S?	Y / P / N	1 / 0,5 / 0		
				0,000	PUBLIC USE & BENEFIT	0,000	public usability of covered areas	allow public use of covered areas (indoor)?	marks_A	1/0,75/0,50/0,25/0		
						0,000	public usability of external areas	allow public use of external areas?	marks_A	1/0,75/0,50/0,25/0		
						0,000	employment	offer new jobs/employment possibilities?	marks_B	1/0,75/0,50/0,25/0		
						0,000	social purpose / mission	help disadvantaged people?	Y / P / N	1 / 0,5 / 0		
				0,000	PROJECT & CONSTRUCTION QUALITY	0,000	townscape & landscape	fit in the urban/natural environment?	marks_A	1/0,75/0,50/0,25/0		
						0,000	design innovation	introduce innovative planning aspects?	Y / P / N	1 / 0,5 / 0		
						0,000	construction quality	consider quality control during execution (tests on materials, correct installation etc.)?	marks_B	1/0,75/0,50/0,25/0		
				0,000	MAINTENANCE & MANAGEMENT	0,000	documentation for facility management (handbooks/guidelines)	provide guidelines /handbooks for facility management?	Y / P / N	1 / 0,5 / 0		
						0,000	EMS documentation (targets, policy, future improvement)	provide suggestions for further improvements, targets and policies?	Y / P / N	1 / 0,5 / 0		
						0,000	maintenance ease and accessibility (systems)	consider easy access and maintenance of technical equipment?	Y / P / N	1 / 0,5 / 0		
		0,000	CULTURAL HERITAGE	0,000	SAFETY & REGULATORY COMPLIANCE	0,000	accessibility	allow independent access and usability of spaces to people with handicap?	Y / P / N	1 / 0,5 / 0		
						0,000	acoustic safety	respect acoustic standards?	Y / P / N	1 / 0,5 / 0		
						0,000	fire resistance	respect fire resistance standards?	Y / P / N	1 / 0,5 / 0		
						0,000	hygiene & health requirements	respect sanitary standards?	Y / P / N	1 / 0,5 / 0		
						0,000	structural & earthquake resistance	respect earthquake-resistance standards?	Y / P / N	1 / 0,5 / 0		
				0,000	LOW INVASIVITY	0,000	layout type	respect the original layout type of the building? (legibility of original scheme or re-establishment of original configuration)	marks_A	1/0,75/0,50/0,25/0		
						0,000	structures	overall maintain existing structural elements/materials? (few substitutions/additions, low-invasive liveability treatment)	marks_A	1/0,75/0,50/0,25/0		
						0,000	finishing & decorative elements	respect historic finishing and decorative apparatus? (preserve recoverable elem., remove incongruous adds, low-invasive degradation interventions)	marks_A	1/0,75/0,50/0,25/0		
						0,000	technical systems	take advantage of existing technical space (compaction), limit negative indoor/outdoor visual impact?	marks_A	1/0,75/0,50/0,25/0		
				0,000	REVERSIBILITY & ADAPTABILITY	0,000	structures	introduce reversible actions on structures?	marks_A	1/0,75/0,50/0,25/0		
						0,000	finishing & protection	introduce reversible actions on finishing layers/materials?	marks_A	1/0,75/0,50/0,25/0		
						0,000	interior partition	introduce removable interior partition?	marks_A	1/0,75/0,50/0,25/0		
						0,000	decorative elements	introduce reversible actions on decorative apparatus?	marks_A	1/0,75/0,50/0,25/0		
						0,000	technical systems	introduce removable/adaptable technical systems?	marks_A	1/0,75/0,50/0,25/0		
				0,000	MATERIAL COMPATIBILITY	0,000	structures	consider appropriate materials for structural integration?	marks_A	1/0,75/0,50/0,25/0		
						0,000	interior partition	consider appropriate materials for interior partition?	marks_A	1/0,75/0,50/0,25/0		
						0,000	finishing & protection	consider appropriate materials for finishing and protection layers?	marks_A	1/0,75/0,50/0,25/0		
						0,000	decorative elements	consider appropriate materials for integrating decorative elements?	marks_A	1/0,75/0,50/0,25/0		
				0,000	RECOGNISABILITY	0,000	new elements (structure/partition)	guarantee clear legibility of new added structural/partition elements?	marks_A	1/0,75/0,50/0,25/0		
						0,000	gap filling / reconstructions (dec.el.)	guarantee clear legibility of new added parts of decorative apparatus?	marks_A	1/0,75/0,50/0,25/0		
		0,000	USER COMFORT & PERCEPTION	0,000	INDOOR COMFORT	0,000	hygrothermal comfort	guarantee hygrothermal comfort indoor?	Y / P / N	1 / 0,5 / 0		
						0,000	indoor air quality	guarantee good indoor air quality? (ventilation)	Y / P / N	1 / 0,5 / 0		
						0,000	acoustic quality / comfort / privacy	guarantee a comfortable level of acoustic quality and privacy?	Y / P / N	1 / 0,5 / 0		
						0,000	visual comfort	guarantee enough light (artificial) and prevent glare?	Y / P / N	1 / 0,5 / 0		
				0,000	PERCEPTUAL QUALITY	0,000	indoor design quality	provide pleasant and comfortable indoor spaces that also give sensation of personal safety?	Y / P / N	1 / 0,5 / 0		
						0,000	exterior views from inside (perceptual comfort)	provide nice views of the outside?	Y / P / N	1 / 0,5 / 0		
						0,000	visual privacy	provide a comfortable level of visual privacy indoor?	Y / P / N	1 / 0,5 / 0		
0,000	ENVIRONMENTAL S.	0,000	ENERGY EFFICIENCY	0,000	ENERGY CONSUMPTION	0,000	thermal insulation of the building envelope	thermally insulate the building envelope?	marks_A	1/0,75/0,50/0,25/0		
						0,000	renewable resources	satisfy energy demand with systems of energy production from renewable resources?	marks_A	1/0,75/0,50/0,25/0		
						0,000	technical system efficiency	choose efficient technical systems in distribution, emission or introduces regenerators?	Y / P / N	1 / 0,5 / 0		
				0,000	SOLAR OPTIMISATION	0,000	orientation	consider optimal orientation for daylight use (natural lighting) when defining space purposes?	Y / P / N	1 / 0,5 / 0		
						0,000	thermal inertia and passive components	provide an adequate level of thermal inertia and time shift or take advantage of passive solar design solutions?	Y / P / N	1 / 0,5 / 0		
						0,000	solar and wind shading	provide architectural or natural barriers for solar and wind control?	Y / P / N	1 / 0,5 / 0		
		0,000	ECOLOGICAL IMPACT	0,000	GREEN TECHNOLOGIES & MATERIALS	0,000	reuse of existing material	reuse existing building materials & finishing?	marks_A	1/0,75/0,50/0,25/0		
						0,000	material certification	use materials provided with certification of origin & low embodied energy (bio-based or from recycled material, local origin, local transport) / low toxicity?	marks_A	1/0,75/0,50/0,25/0		
						0,000	durability & maintenance	prefer materials with long durability and easy maintenance (e.g. Cleaning)?	Y / P / N	1 / 0,5 / 0		
				0,000	POLLUTION REDUCTION	0,000	low acoustic pollution	limit indoor to outdoor noise and indoor noise from technical systems?	Y / P / N	1 / 0,5 / 0		
						0,000	low luminous pollution	provide automatic lighting systems or external limitations?	Y / P / N	1 / 0,5 / 0		
						0,000	low heat island effect	use materials and colours for roofing or external paving that prevent heat island effect?	Y / P / N	1 / 0,5 / 0		
						0,000	waste optimisation	reduce waste by recycling or using waste for energy production?	Y / P / N	1 / 0,5 / 0		
						0,000	rational use of water supplies	reduce the water amount for external and other uses by grey water/rainwater collection?	Y / P / N	1 / 0,5 / 0		
				0,000	CONSTRUCTION SITE MANAGEMENT	0,000	resource usage	limit use of ground, water, energy during construction?	Y / P / N	1 / 0,5 / 0		
						0,000	pollution reduction	avoid or limit luminous and acoustic pollution, dust production, soil and water contamination during construction?	Y / P / N	1 / 0,5 / 0		
						0,000	waste optimisation	limit production of waste during construction?	Y / P / N	1 / 0,5 / 0		
						0,000	impact on neighbourhood	limit negative impact of construction works on local viability, residents and commercial facilities?	Y / P / N	1 / 0,5 / 0		
		0,000	ENVIRONMENTAL QUALITY	0,000	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,000	reclamation of degraded areas	transform degraded areas into green surfaces?	Y / P / N	1 / 0,5 / 0		
						0,000	historical asset and biodiversity	re-establish a historical arrangement, maintains or improves existing biodiversity?	Y / P / N	1 / 0,5 / 0		
						0,000	ground permeability	preserve or enhance ground permeability?	Y / P / N	1 / 0,5 / 0		
						0,000	walkways and outdoor furniture	provide exterior spaces with walkways and adequate furniture?	Y / P / N	1 / 0,5 / 0		
				0,000	TRANSPORT FACILITIES	0,000	public transport	improve or favour public transport service?	Y / P / N	1 / 0,5 / 0		
						0,000	bicycle facilities	improve bicycle trails and facilities (bike-sharing, stand) etc.)?	Y / P / N	1 / 0,5 / 0		
						0,000	parking facilities	offer sufficient car parks and promotes eco-mobility?	Y / P / N	1 / 0,5 / 0		
				0,000	IMPACT ON NEIGHBOURHOOD	0,000	solar potential of adjacent property	avoid limitations on daylight, solar energy potential of adjacent property?	Y / P / N	1 / 0,5 / 0		
						0,000	public transport peak	avoid troubles with public transport during peak hours due to the building user population?	Y / P / N	1 / 0,5 / 0		
						0,000	local road capacity	avoid inconvenience of exceeding local road capacity with the building user population?	Y / P / N	1 / 0,5 / 0		
0,000	ECONOMIC SUSTAINABILITY	0,000	LCC COVERAGE	FALSE	FINANCEABILITY			Are initial costs (including transformation c.) covered until the building renovation is completed?	marks_A	1/0,75/0,50/0,25/0		
				FALSE	OPERATING COST COVERAGE			Are operating costs low and covered throughout the considered life of the building?	marks_A	1/0,75/0,50/0,25/0		
		FALSE	PROFITABILITY					provide a positive value for expected profit?	marks_A	1/0,75/0,50/0,25/0		NP
		FALSE	LOW RISK					Does the project's success depend on low-risk factors?	marks_A	1/0,75/0,50/0,25/0		
		FALSE	UTILITY					entail benefits for local community/area?	marks_A	1/0,75/0,50/0,25/0		

ATTACHMENT VII – EVALUATION OF CASE STUDIES

A_VII.1 – Villa Louise: VOC and SUS Models

FINAL RESULT	
RES	0,665
PRO	0,535
ACC	0,663
C&A	0,705
PUB	0,685
min w	*0,535*
POTENTIALITY	
RES	0,495
PRO	0,338
ACC	0,457
C&A	0,595
PUB	0,524
min w	*0,397*
COMPATIBILITY	
RES	0,612
PRO	0,390
ACC	0,586
C&A	0,416
PUB	0,582
min w	*0,403*
MINIMUM	
CQ	0,433
EC	0,674
B&SQ	0,547
B&SV	0,546

RES	PRO	ACC	C&A	PUB	A	RES	PRO	ACC	C&A	PUB	B	RES	PRO	ACC	C&A	PUB	C	RES	PRO	ACC	C&A	PUB	E	F *to be pre-selected (choose 1)*	EVAL.
0,663	0,433	0,597	0,623	0,624	CONTEXT QUALITY (territory)	0,670	0,371	0,627	0,491	0,618	ECOLOGICAL-ENVIRONMENTAL Q.	0,000	0,000	0,000	0,000	0,000	LANDSCAPE QUALITY								0
												0,330	0,166	0,316	0,227	0,297	NATURAL AMENITIES								1
												0,340	0,206	0,311	0,264	0,320	HEALTH								1
												0,000	0,000	0,000	0,000	0,000	WINE & FOOD TRAILS								0
						0,504	0,295	0,372	0,370	0,403	BUILT ENVIRONMENT Q.	1,000	0,765	0,859	0,858	0,894	FACILITY PROXIMITY	0,141	0,139	0,183	0,160	0,160	gastronomy		1
																		0,189	0,122	0,106	0,120	0,157	education facilities		1
																		0,159	0,125	0,117	0,154	0,139	public administration		1
																		0,168	0,128	0,146	0,123	0,139	medical provision		1
																		0,170	0,125	0,152	0,136	0,167	sport & leisure facilities		1
																		0,173	0,125	0,154	0,165	0,133	service providers / retail commercial facilities		1
						0,551	0,377	0,576	0,710	0,534	POSITION & ACCESSIBILITY (AREA)	0,819	0,118	0,888	0,986	0,903	POSITION	0,819	0,118	0,888	0,986	0,903		URBAN CENTRE	1
																		0,000	0,000	0,000	0,000	0,000		CITY/TOWN EDGE	0
																		0,000	0,000	0,000	0,000	0,000		SUBURBAN	0
												0,778	0,562	0,735	0,680	0,695	LOCAL ACCESSIBILITY	0,000	0,000	0,000	0,000	0,000		COUNTY ROAD (REGIONAL)	0
																		0,778	0,562	0,735	0,680	0,695		URBAN / LOCAL ROAD	1
												0,194	0,528	0,400	0,313	0,225	MAJOR INFRASTRUCTURES	0,194	0,528	0,400	0,313	0,225	HIGHWAY EXIT		1
																		0,000	0,000	0,000	0,000	0,000	RAILWAY STATION		0
						1,000	0,699	0,895	0,898	0,944	TRANSPORT FACILITIES	1,000	0,822	0,925	0,955	0,985	PUBLIC TRANSPORT	0,500	0,418	0,470	0,492	0,508	BUS STOP PROXIMITY <300m		1
																		0,500	0,403	0,455	0,462	0,478	BUS FREQUENCY <15'		1
												0,498	0,360	0,466	0,441	0,457	BICYCLE & WALKING								1
0,623	0,672	0,727	0,992	0,784	ECONOMIC CONTEXT (area)	0,623	0,672	0,727	0,992	0,784	LOCATION	0,543	0,543	0,557	0,986	0,723	TYPE OF ZONE	0,000	0,000	0,000	0,000	0,000		RESIDENTIAL	0
																		0,000	0,000	0,000	0,000	0,000		PRODUCTION	0
																		0,000	0,000	0,000	0,000	0,000		TOURISTIC / GASTRONOMIC	0
																		0,543	0,543	0,557	0,986	0,723		ADMINISTRATIVE/COMMERCIAL	1
																		0,000	0,000	0,000	0,000	0,000		AGRICULTURAL	0
												0,194	0,326	0,416	0,455	0,313	VISIBILITY								1
0,743	0,539	0,723	0,555	0,711	BUILDING & SITE QUALITY	1,000	0,672	0,975	0,817	0,876	BUILDING QUALITY & FEATURES	0,325	0,189	0,356	0,299	0,335	APPEAL/HISTORIC CHARACTER								1
												0,309	0,294	0,253	0,278	0,284	SECONDARY BUILDINGS								1
												0,366	0,189	0,366	0,240	0,258	SPECIAL FEATURES								1
						0,161	0,367	0,204	0,207	0,320	BUILDING EFFICIENCY	0,404	0,923	0,626	0,583	0,859	VOLUME SIZE	0,000	0,000	0,000	0,000	0,000		*SMALL (<1000 mc)*	0
																		0,000	0,000	0,000	0,000	0,000		*MEDIUM (1000-5000 mc)*	0
																		0,404	0,923	0,626	0,583	0,859		*BIG (>5000 mc)*	1
												0,000	0,000	0,000	0,000	0,000	HEIGHT								0
												0,000	0,000	0,000	0,000	0,000	FLOOR LOAD								0
						0,848	*0,806*	*0,723*	*0,612*	*0,902*	SITE AVAILABILITY & SIZE	0,848	0,806	0,723	0,612	0,902	AREA SIZE	0,000	0,000	0,000	0,000	0,000		*SMALL (<100%)*	0
																		0,000	0,000	0,000	0,000	0,000		*MEDIUM (100-200%)*	0
																		0,848	0,806	0,723	0,612	0,902		*BIG (>200%)*	1
						1,000	0,458	0,942	0,734	0,922	SITE QUALITY & FEATURES	0,320	0,147	0,330	0,214	0,292	AMENITY/BIODIVERSITY								1
												0,350	0,164	0,326	0,286	0,315	SAFETY & HEALTH								1
												0,330	0,147	0,286	0,234	0,316	FEATURES								1
0,695	0,514	0,684	0,577	0,688	B&S VERSATILITY	0,521	0,462	0,519	0,510	0,538	BUILDING VERSATILITY	0,701	0,400	0,749	0,689	0,783	TRANSFORMATION VS. LIMITATION	0,262	0,153	0,263	0,233	0,268	PRESERVATION OF THE EXTERIOR		1
																		0,199	0,113	0,183	0,211	0,229	PRESERVATION OF THE INTERIOR		1
																		0,000	0,000	0,000	0,000	0,000	BUILDING TECHNIQUES		0
																		0,240	0,135	0,303	0,245	0,286	PRESERVATION OF SPECIFIC ELEMENTS		1
												0,000	0,000	0,000	0,000	0,000	INTERIOR SPACE FRACTIONABILITY								0
												0,227	0,216	0,217	0,217	0,214	DISTRIBUTION VARIATION & INDEPENDENT UNITS								1
												0,204	0,217	0,200	0,207	0,210	SERVICE ADAPTABILITY								1
												0,000	0,000	0,000	0,000	0,000	ENLARGEMENT OPPORTUNITIES								0
						0,946	0,623	0,944	0,713	0,911	SITE VERSATILITY	0,897	0,307	1,000	0,720	0,888	TRANSFORMATION VS. LIMITATION	0,375	0,099	0,458	0,296	0,337	ANIMAL / LANDSCAPE PROTECTION AREA		1
																		0,521	0,209	0,542	0,424	0,551	PRESERVATION OF SPECIFIC ELEMENTS		1
												0,984	1,000	0,895	0,896	0,960	BUILT ASSET VARIATION	0,451	0,492	0,402	0,419	0,443	NEW BUILDING CONSTRUCTION		1
																		0,533	0,508	0,493	0,477	0,517	DEMOLITION OF SECONDARY BUILDINGS		1

FINAL RESULT	SUSTAINABILITY	RES.	MACRO-CATEGORY	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,670	GENERAL SUSTAINABILITY LEVEL	0,853	SOCIO-CULT. SUST.	0,784	PROCESS QUALITY	0,684	COMMUNITY ENGAGEMENT & VALUES	0,50	public participation	*in part*	
								0,50	fulfilment of current needs	*in part*	
								0,75	respect for people's values	*mostly*	
								1,00	increase of values	*yes*	
						0,556	PUBLIC USE & BENEFIT	0,25	public use and usability of covered areas	*not enough*	
								1,00	public use and usability of external areas	*absolutely*	
								1,00	employment	*many*	
								0,00	social purpose / mission	*no*	
						1,000	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	*absolutely*	
								0,00	design innovation	*don't know*	
								0,00	construction quality assurance	*don't know*	
						0,000	MAINTENANCE & MANAGEMENT	0,00	documentation for facility	*don't know*	
								0,00	EMS documentation (targets, policy, future improvement)	*don't know*	
								0,00	maintenance ease and accessibility (systems)	*don't know*	
				0,844	CULTURAL HERITAGE	0,866	SAFETY & REGULATORY COMPLIANCE	1,00	accessibility	*yes*	
								0,00	acoustic safety	*don't know*	
								1,00	fire resistance	*yes*	
								1,00	hygiene & health requirements	*yes*	
								0,50	structural & earthquake resistance	*in part*	
						0,815	LOW INVASIVITY	1,00	layout type	*absolutely*	
								0,75	structures	*mostly*	
								0,75	finishing & decorative elements	*mostly*	
								0,75	technical systems	*mostly*	
						0,000	REVERSIBILITY & ADAPTABILITY	0,00	structures	*don't know*	
								0,00	finishing & protection	*don't know*	
								0,00	interior partition	*don't know*	
								0,00	decorative elements	*don't know*	
								0,00	technical systems	*don't know*	
						0,000	MATERIAL COMPATIBILITY	0,00	structures	*don't know*	
								0,00	interior partition	*don't know*	
								0,00	finishing & protection	*don't know*	
								0,00	decorative elements	*don't know*	
						0,000	RECOGNISABILITY	0,00	new elements (structure/partition)	*don't know*	
								0,00	gap filling / reconstructions (dec.el.)	*don't know*	
				1,000	USER COMFORT & PERCEPTION	0,000	INDOOR COMFORT	0,00	hygrothermal comfort	*don't know*	
								0,00	indoor air quality	*don't know*	
								0,00	acoustic quality / comfort / privacy	*don't know*	
								0,00	visual comfort	*don't know*	
						1,000	PERCEPTUAL QUALITY	0,00	indoor design quality	*don't know*	
								1,00	exterior views from inside (perceptual comfort)	*yes*	
								1,00	visual privacy	*yes*	
		0,400	ENVIRONMENTAL S.	0,207	ENERGY EFFICIENCY	0,134	ENERGY CONSUMPTION	0,25	thermal insulation of the building	*not enough*	
								0,00	energy production from renewable resources	*not at all*	
								0,00	technical system efficiency	*don't know*	
						0,738	SOLAR OPTIMISATION	0,50	orientation	*in part*	
								0,00	thermal inertia and passive components	*don't know*	
								1,00	solar and wind shading	*yes*	
				0,000	ECOLOGICAL IMPACT	0,000	GREEN TECHNOLOGIES & MATERIALS	0,00	reuse of existing material	*don't know*	
								0,00	material certification	*don't know*	
								0,00	durability & maintenance	*don't know*	
						0,000	POLLUTION REDUCTION	0,00	low acoustic pollution	*don't know*	
								0,00	low luminous pollution	*don't know*	
								0,00	low heat island effect	*don't know*	
								0,00	waste optimisation	*don't know*	
								0,00	rational use of water supplies	*don't know*	
						0,000	CONSTRUCTION SITE MANAGEMENT	0,00	resource usage	*don't know*	
								0,00	pollution reduction	*don't know*	
								0,00	waste optimisation	*don't know*	
								0,00	impact on neighbourhood	*don't know*	
				1,000	ENVIRONMENTAL QUALITY	1,000	IMPROVEMENT OF EXTERNAL GREEN AREAS	1,00	reclamation of degraded areas	*yes*	
								0,00	historical asset and biodiversity	*don't know*	
								1,00	ground permeability	*yes*	
								0,00	walkways and outdoor furniture	*don't know*	
						1,000	TRANSPORT FACILITIES	1,00	public transport	*yes*	
								0,00	bicycle facilities	*don't know*	
								1,00	parking facilities	*yes*	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	*yes*	
								1,00	public transport peak	*yes*	
								1,00	local road capacity	*yes*	
		0,713	ECONOMIC SUSTAINABILITY	0,500	LCC COVERAGE	0,500	FINANCEABILITY			*in part*	
						0,000	OPERATING COST COVERAGE			*don't know*	
				0,000	PROFITABILITY					*don't know*	NP
				1,000	LOW RISK					*absolutely*	
				1,000	UTILITY					*absolutely*	

A_VII.2 – Vila Laščak: VOC and SUS Models

FINAL RESULT		RES	PRO	ACC	C&A	PUB
RES	0,608					
PRO	0,282					
ACC	0,531					
C&A	0,412					
PUB	0,497					
min w	*0,347*					
POTENTIALITY						
RES	0,541					
PRO	0,220					
ACC	0,371	0,651	0,465	0,612	0,496	0,521
C&A	0,372					
PUB	0,366					
min w	*0,332*					
COMPATIBILITY						
RES	0,383					
PRO	0,594					
ACC	0,390					
C&A	0,744					
PUB	0,358					
min w	*0,219*	0,790	0,084	0,403	0,356	0,453
MINIMUM						
CQ	0,494					
EC	0,281					
B&SQ	0,547					
B&SV	0,204					

A		RES	PRO	ACC	C&A	PUB
CONTEXT QUALITY (territory)		1,000	0,532	0,957	0,732	0,873
ECONOMIC CONTEXT (area)		0,498	0,360	0,466	0,441	0,457
BUILDING & SITE QUALITY		0,743	0,539	0,723	0,555	0,711
B&S VERSATILITY		0,308	0,157	0,350	0,251	0,315

B		RES	PRO	ACC	C&A	PUB
ECOLOGICAL-ENVIRONMENTAL Q.		0,330	0,161	0,330	0,241	0,255
		0,330	0,166	0,316	0,227	0,297
		0,340	0,206	0,311	0,264	0,320
		0,000	0,000	0,000	0,000	0,000
BUILT ENVIRONMENT Q.		0,832	0,637	0,713	0,735	0,756
POSITION & ACCESSIBILITY (AREA)		0,778	0,562	0,735	0,680	0,695
		0,610	1,000	0,847	0,641	0,545
TRANSPORT FACILITIES		0,000	0,000	0,000	0,000	0,000
		0,498	0,360	0,466	0,441	0,457
LOCATION		1,000	0,132	0,722	0,653	0,695
BUILDING QUALITY & FEATURES		0,325	0,189	0,356	0,299	0,335
		0,309	0,294	0,253	0,278	0,284
		0,366	0,189	0,366	0,240	0,258
BUILDING EFFICIENCY		0,404	0,923	0,626	0,583	0,859
		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
SITE AVAILABILITY & SIZE		0,848	0,806	0,723	0,612	0,902
SITE QUALITY & FEATURES		0,320	0,147	0,330	0,214	0,292
		0,350	0,164	0,326	0,286	0,315
		0,330	0,147	0,286	0,234	0,316
BUILDING VERSATILITY		0,502	0,288	0,566	0,478	0,554
		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
		0,204	0,217	0,200	0,207	0,210
		0,000	0,000	0,000	0,000	0,000
SITE VERSATILITY		0,897	0,307	1,000	0,720	0,888
		0,000	0,000	0,000	0,000	0,000

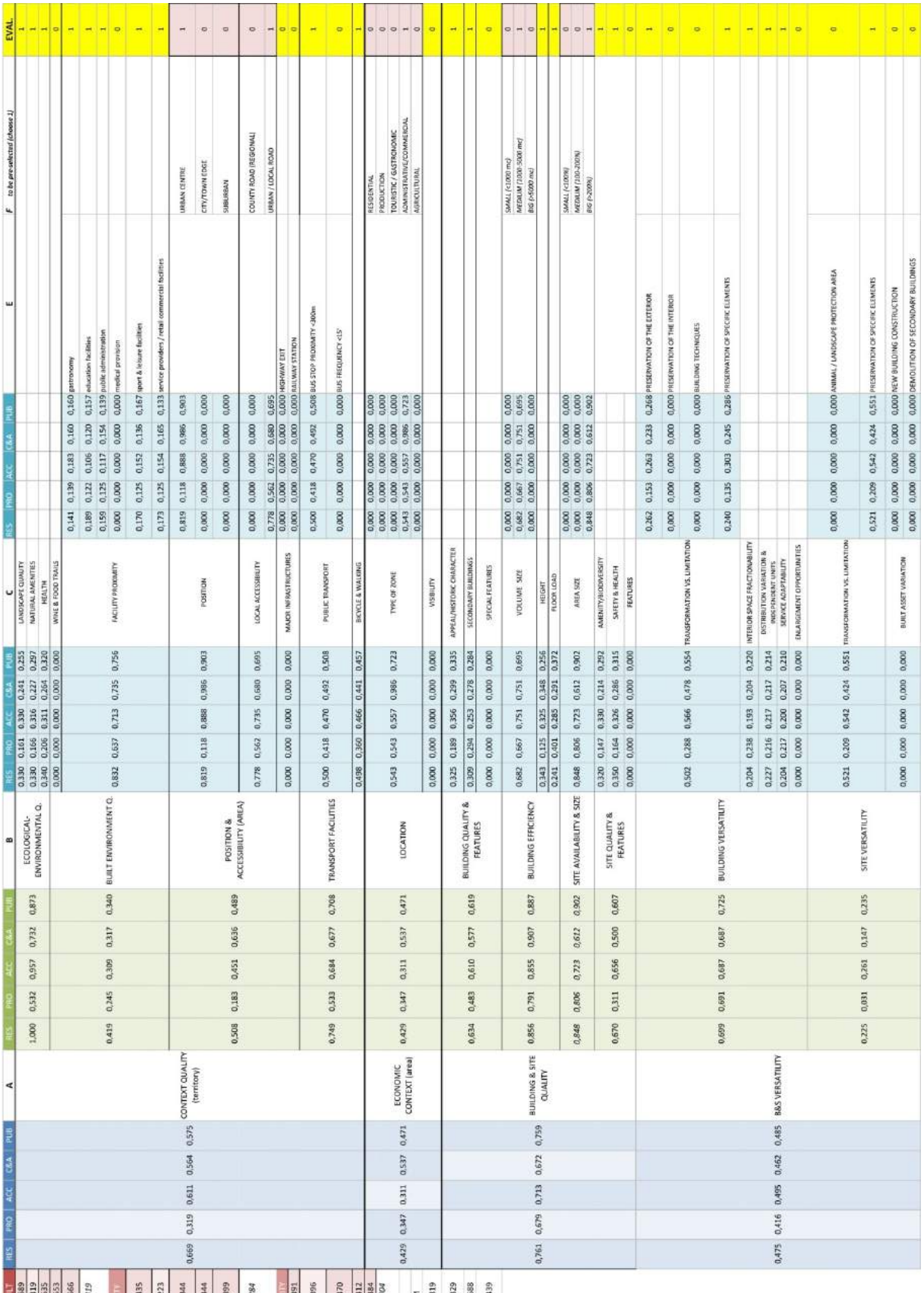
C		RES	PRO	ACC	C&A	PUB
LANDSCAPE QUALITY						
NATURAL AMENITIES						
HEALTH						
WINE & FOOD TRAILS		0,141	0,139	0,183	0,160	0,160
FACILITY PROXIMITY		0,189	0,122	0,106	0,120	0,157
		0,159	0,125	0,117	0,154	0,139
		0,000	0,000	0,000	0,000	0,000
		0,170	0,125	0,152	0,136	0,167
		0,173	0,125	0,154	0,165	0,133
POSITION		0,000	0,000	0,000	0,000	0,000
		0,873	0,488	0,707	0,529	0,737
		0,000	0,000	0,000	0,000	0,000
LOCAL ACCESSIBILITY		0,000	0,000	0,000	0,000	0,000
		0,778	0,562	0,735	0,680	0,695
MAJOR INFRASTRUCTURES		0,194	0,528	0,400	0,313	0,225
		0,416	0,472	0,447	0,329	0,320
PUBLIC TRANSPORT		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
BICYCLE & WALKING		1,000	0,132	0,722	0,653	0,695
TYPE OF ZONE		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
VISIBILITY		0,000	0,000	0,000	0,000	0,000
APPEAL/HISTORIC CHARACTER						
SECONDARY BUILDINGS						
SPECIAL FEATURES						
VOLUME SIZE		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
HEIGHT		0,404	0,923	0,626	0,583	0,859
FLOOR LOAD						
AREA SIZE		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
AMENITY/BIODIVERSITY		0,848	0,806	0,723	0,612	0,902
SAFETY & HEALTH						
FEATURES						
TRANSFORMATION VS. LIMITATION		0,262	0,153	0,263	0,233	0,268
		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000
INTERIOR SPACE FRACTIONABILITY						
DISTRIBUTION VARIATION & INDEPENDENT UNITS						
SERVICE ADAPTABILITY						
ENLARGEMENT OPPORTUNITIES						
TRANSFORMATION VS. LIMITATION		0,375	0,099	0,458	0,296	0,337
		0,621	0,209	0,542	0,424	0,551
BUILT ASSET VARIATION		0,000	0,000	0,000	0,000	0,000
		0,000	0,000	0,000	0,000	0,000

E	F *to be pre-selected (choose 1)*	EVAL.
		1
		1
		1
		0
0,160 gastronomy		1
0,157 education facilities		1
0,139 public administration		1
0,000 medical provision		0
0,167 sport & leisure facilities		1
0,133 service providers / retail commercial facilities		1
0,000	URBAN CENTRE	0
0,737	CITY/TOWN EDGE	1
0,000	SUBURBAN	0
0,000	COUNTY ROAD (REGIONAL)	0
0,695	URBAN / LOCAL ROAD	1
0,225 HIGHWAY EXIT		1
0,320 RAILWAY STATION		1
0,000 BUS STOP PROXIMITY <300m		0
0,000 BUS FREQUENCY <15'		0
0,695	RESIDENTIAL	1
0,000	PRODUCTION	0
0,000	TOURISTIC / GASTRONOMIC	0
0,000	ADMINISTRATIVE/COMMERCIAL	0
0,000	AGRICULTURAL	0
		0
		1
		1
		1
	SMALL (<1000 m2)	0
	MEDIUM (1000-5000 m2)	0
	BIG (>5000 m2)	1
		0
	SMALL (<10%)	0
	MEDIUM (10-20%)	0
	BIG (>20%)	1
		1
		1
0,268 PRESERVATION OF THE EXTERIOR		1
0,000 PRESERVATION OF THE INTERIOR		0
0,000 BUILDING TECHNIQUES		0
0,286 PRESERVATION OF SPECIFIC ELEMENTS		1
		0
		0
		1
		0
0,337 ANIMAL / LANDSCAPE PROTECTION AREA		1
0,551 PRESERVATION OF SPECIFIC ELEMENTS		1
0,000 NEW BUILDING CONSTRUCTION		0
0,000 DEMOLITION OF SECONDARY BUILDINGS		0

FINAL RESULT	SUSTAINABILITY	RES.	MACRO-CATEGORY	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,545	GENERAL SUSTAINABILITY LEVEL	0,746	SOCIO-CULT. SUST.	0,630	PROCESS QUALITY	0,493	COMMUNITY ENGAGEMENT & VALUES	0,00	public participation	no	
								0,00	fulfilment of current needs	don't know	
								0,00	respect for people's values	don't know	
								1,00	increase of values	yes	
						0,819	PUBLIC USE & BENEFIT	0,75	public use and usability of covered areas	mostly	
								1,00	public use and usability of external areas	absolutely	
								0,50	employment	a few	
								1,00	social purpose / mission	yes	
						0,551	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	absolutely	
								0,00	design innovation	no	
								0,00	construction quality assurance	don't know	
						1,000	MAINTENANCE & MANAGEMENT	0,00	documentation for facility	don't know	
								0,00	EMS documentation (targets, policy, future improvement)	don't know	
								1,00	maintenance ease and accessibility (systems)	yes	
				0,720	CULTURAL HERITAGE	0,890	SAFETY & REGULATORY COMPLIANCE	1,00	accessibility	yes	
								1,00	acoustic safety	yes	
								1,00	fire resistance	yes	
								1,00	hygiene & health requirements	yes	
								0,50	structural & earthquake resistance	in part	
						0,699	LOW INVASIVITY	1,00	layout type	absolutely	
								0,00	structures	not at all	
								0,75	finishing & decorative elements	mostly	
								1,00	technical systems	absolutely	
						0,650	REVERSIBILITY & ADAPTABILITY	0,00	structures	not at all	
								0,00	finishing & protection	don't know	
								1,00	interior partition	absolutely	
								0,00	decorative elements	don't know	
								1,00	technical systems	absolutely	
						0,484	MATERIAL COMPATIBILITY	0,00	structures	not at all	
								1,00	interior partition	absolutely	
								0,00	finishing & protection	don't know	
								0,00	decorative elements	don't know	
						0,131	RECOGNISABILITY	0,25	new elements (structure/partition)	not enough	
								0,00	gap filling / reconstructions (dec.el.)	not at all	
				1,000	USER COMFORT & PERCEIVING	1,000	INDOOR COMFORT	1,00	hygrothermal comfort	yes	
								1,00	indoor air quality	yes	
								1,00	acoustic quality / comfort / privacy	yes	
								1,00	visual comfort	yes	
						1,000	PERCEPTUAL QUALITY	0,00	indoor design quality	don't know	
								1,00	exterior views from inside (perceptual comfort)	yes	
								1,00	visual privacy	yes	
		0,648	ENVIRONMENTAL S.	0,534	ENERGY EFFICIENCY	0,506	ENERGY CONSUMPTION	0,50	thermal insulation of the building	in part	
								0,00	energy production from renewable resources	not at all	
								1,00	technical system efficiency	yes	
						0,738	SOLAR OPTIMISATION	0,50	orientation	in part	
								0,00	thermal inertia and passive components	don't know	
								1,00	solar and wind shading	yes	
				0,503	ECOLOGICAL IMPACT	0,000	GREEN TECHNOLOGIES & MATERIALS	0,00	reuse of existing material	don't know	
								0,00	material certification	don't know	
								0,00	durability & maintenance	don't know	
						0,503	POLLUTION REDUCTION	0,00	low acoustic pollution	don't know	
								1,00	low luminous pollution	yes	
								0,50	low heat island effect	in part	
								0,00	waste optimisation	don't know	
								0,00	rational use of water supplies	no	
						0,000	CONSTRUCTION SITE MANAGEMENT	0,00	resource usage	don't know	
								0,00	pollution reduction	don't know	
								0,00	waste optimisation	don't know	
								0,00	impact on neighbourhood	don't know	
				0,887	ENVIRONMENTAL QUALITY	0,751	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,50	reclamation of degraded areas	in part	
								1,00	historical asset and biodiversity	yes	
								0,50	ground permeability	in part	
								1,00	walkways and outdoor furniture	yes	
						1,000	TRANSPORT FACILITIES	0,00	public transport	don't know	NP
								0,00	bicycle facilities	don't know	
								1,00	parking facilities	yes	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	yes	
								0,00	public transport peak	don't know	NP
								1,00	local road capacity	yes	
		0,251	ECONOMIC SUSTAINABILITY	0,000	LCC COVERAGE	0,000	FINANCEABILITY			don't know	
						0,000	OPERATING COST COVERAGE			don't know	
				0,000	PROFITABILITY					don't know	NP
				0,250	LOW RISK					not enough	
				0,750	UTILITY					mostly	

FINAL RESULT	SUSTAINABILITY	RES.	MACRO-CATEGORY	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,559	GENERAL SUSTAINABILITY LEVEL	0,725	SOCIO-CULT. SUST.	0,593	PROCESS QUALITY	0,493	COMMUNITY ENGAGEMENT & VALUES	0,00	public participation	no	
								0,00	fulfilment of current needs	don't know	
								0,00	respect for people's values	don't know	
								1,00	increase of values	yes	
						0,819	PUBLIC USE & BENEFIT	0,75	public use and usability of covered areas	mostly	
								1,00	public use and usability of external areas	absolutely	
								0,50	employment	a few	
								1,00	social purpose / mission	yes	
						0,551	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	absolutely	
								0,00	design innovation	no	
								0,00	construction quality assurance	don't know	
						0,528	MAINTENANCE & MANAGEMENT	0,00	documentation for facility	don't know	
								0,00	EMS documentation (targets, policy, future improvement)	no	
								1,00	maintenance ease and accessibility (systems)	yes	
				0,700	CULTURAL HERITAGE	0,890	SAFETY & REGULATORY COMPLIANCE	1,00	accessibility	yes	
								1,00	acoustic safety	yes	
								1,00	fire resistance	yes	
								1,00	hygiene & health requirements	yes	
								0,50	structural & earthquake resistance	in part	
						0,699	LOW INVASIVITY	1,00	layout type	absolutely	
								0,00	structures	not at all	
								0,75	finishing & decorative elements	mostly	
								1,00	technical systems	absolutely	
						0,475	REVERSIBILITY & ADAPTABILITY	0,00	structures	not at all	
								0,00	finishing & protection	not at all	
								1,00	interior partition	absolutely	
								0,00	decorative elements	don't know	
								1,00	technical systems	absolutely	
						0,733	MATERIAL COMPATIBILITY	0,00	structures	not at all	
								1,00	interior partition	absolutely	
								1,00	finishing & protection	absolutely	
								1,00	decorative elements	absolutely	
						0,131	RECOGNISABILITY	0,25	new elements (structure/partition)	not enough	
								0,00	gap filling / reconstructions (dec.el.)	not at all	
				1,000	USER COMFORT & PERCEPTION	1,000	INDOOR COMFORT	1,00	hygrothermal comfort	yes	
								1,00	indoor air quality	yes	
								1,00	acoustic quality / comfort / privacy	yes	
								1,00	visual comfort	yes	
						1,000	PERCEPTUAL QUALITY	0,00	indoor design quality	don't know	
								1,00	exterior views from inside (perceptual comfort)	yes	
								1,00	visual privacy	yes	
		0,614	ENVIRONMENTAL S.	0,534	ENERGY EFFICIENCY	0,506	ENERGY CONSUMPTION	0,50	thermal insulation of the building	in part	
								0,00	energy production from renewable resources	not at all	
								1,00	technical system efficiency	yes	
						0,738	SOLAR OPTIMISATION	0,50	orientation	in part	
								0,00	thermal inertia and passive components	don't know	
								1,00	solar and wind shading	yes	
				0,384	ECOLOGICAL IMPACT	0,250	GREEN TECHNOLOGIES & MATERIALS	0,25	reuse of existing material	not enough	
								0,00	material certification	don't know	
								0,00	durability & maintenance	don't know	
						0,503	POLLUTION REDUCTION	0,00	low acoustic pollution	don't know	
								1,00	low luminous pollution	yes	
								0,50	low heat island effect	in part	
								0,00	waste optimisation	don't know	
								0,00	rational use of water supplies	no	
						0,746	CONSTRUCTION SITE MANAGEMENT	0,50	resource usage	in part	
								1,00	pollution reduction	yes	
								0,00	waste optimisation	don't know	
								0,00	impact on neighbourhood	don't know	
				0,887	ENVIRONMENTAL QUALITY	0,751	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,50	reclamation of degraded areas	in part	
								1,00	historical asset and biodiversity	yes	
								0,50	ground permeability	in part	
								1,00	walkways and outdoor furniture	yes	
						1,000	TRANSPORT FACILITIES	0,00	public transport	don't know	NP
								0,00	bicycle facilities	don't know	
								1,00	parking facilities	yes	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	yes	
								0,00	public transport peak	don't know	NP
								1,00	local road capacity	yes	
		0,341	ECONOMIC SUSTAINABILITY	0,298	LCC COVERAGE	0,500	FINANCEABILITY			in part	
						0,000	OPERATING COST COVERAGE			not at all	
				0,000	PROFITABILITY					don't know	NP
				0,250	LOW RISK					not enough	
				0,750	UTILITY					mostly	

A_VII.3 –Gradisca Castle: Palazzo del Capitano: VOC and SUS Models



FINAL RESULT	SUSTAINABILITY	RES.	MACRO-CATEGORY	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,506	GENERAL SUSTAINABILITY LEVEL	0,694	SOCIO-CULT. SUST.	0,613	PROCESS QUALITY	0,748	COMMUNITY ENGAGEMENT & VALUES	0,00	public participation	*no*	
								1,00	fulfilment of current needs	*absolutely*	
								1,00	respect for people's values	*absolutely*	
								1,00	increase of values	*yes*	
						0,322	PUBLIC USE & BENEFIT	0,25	public use and usability of covered areas	*not enough*	
								1,00	public use and usability of external areas	*absolutely*	
								0,00	employment	*no*	
								0,00	social purpose / mission	*no*	
						0,700	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	*absolutely*	
								0,00	design innovation	*no*	
								1,00	construction quality assurance	*many*	
						0,514	MAINTENANCE & MANAGEMENT	1,00	documentation for facility	*yes*	
								0,00	EMS documentation (targets, policy, future improvement)	*in part*	
								0,00	maintenance ease and accessibility (systems)	*don't know*	
				0,606	CULTURAL HERITAGE	0,742	SAFETY & REGULATORY COMPLIANCE	1,00	accessibility	*yes*	
								0,00	acoustic safety	*don't know*	
								0,00	fire resistance	*don't know*	
								0,00	hygiene & health requirements	*don't know*	
								0,50	structural & eartquake resistance	*in part*	
						0,503	LOW INVASIVITY	1,00	layout type	*absolutely*	
								0,25	structures	*not enough*	
								0,75	finishing & decorative elements	*mostly*	
								0,00	technical systems	*not at all*	
						0,351	REVERSIBILITY & ADAPTABILITY	0,00	structures	*not at all*	
								0,00	finishing & protection	*not at all*	
								1,00	interior partition	*absolutely*	
								0,00	decorative elements	*don't know*	NP
								0,50	technical systems	*in part*	
						0,914	MATERIAL COMPATIBILITY	0,75	structures	*mostly*	
								1,00	interior partition	*absolutely*	
								1,00	finishing & protection	*absolutely*	
								0,00	decorative elements	*don't know*	NP
						1,000	RECOGNISABILITY	1,00	new elements (structure/partition)	*absolutely*	
								0,00	gap filling / reconstructions (dec.el.)	*don't know*	NP
				1,000	USER COMFORT & PERCEPTION	1,000	INDOOR COMFORT	0,00	hygrothermal comfort	*don't know*	
								0,00	indoor air quality	*don't know*	
								0,00	acoustic quality / comfort / privacy	*don't know*	
								1,00	visual comfort	*yes*	
						1,000	PERCEPTUAL QUALITY	0,00	indoor design quality	*don't know*	
								1,00	exterior views from inside (perceptual comfort)	*yes*	
								1,00	visual privacy	*yes*	
		0,447	ENVIRONMENTAL S.	0,099	ENERGY EFFICIENCY	0,000	ENERGY CONSUMPTION	0,00	thermal insulation of the building	*not at all*	
								0,00	energy production from renewable resources	*not at all*	
								0,00	technical system efficiency	*don't know*	
						0,821	SOLAR OPTIMISATION	0,50	orientation	*in part*	
								1,00	thermal inertia and passive components	*yes*	
								1,00	solar and wind shading	*yes*	
				0,484	ECOLOGICAL IMPACT	0,500	GREEN TECHNOLOGIES & MATERIALS	0,50	reuse of existing material	*in part*	
								0,00	material certification	*don't know*	
								0,50	durability & maintenance	*in part*	
						0,339	POLLUTION REDUCTION	0,00	low acoustic pollution	*don't know*	
								0,00	low luminous pollution	*don't know*	
								0,50	low heat island effect	*in part*	
								0,50	waste optimisation	*in part*	
								0,00	rational use of water supplies	*no*	
						0,000	CONSTRUCTION SITE MANAGEMENT	0,00	resource usage	*don't know*	
								0,00	pollution reduction	*don't know*	
								0,00	waste optimisation	*don't know*	
								0,00	impact on neighbourhood	*don't know*	
				0,824	ENVIRONMENTAL QUALITY	0,873	IMPROVEMENT OF EXTERNAL GREEN AREAS	1,00	reclamation of degraded areas	*yes*	
								1,00	historical asset and biodiversity	*yes*	
								1,00	ground permeability	*yes*	
								0,50	walkways and outdoor furniture	*in part*	
						0,741	TRANSPORT FACILITIES	0,50	public transport	*in part*	
								0,00	bicycle facilities	*don't know*	
								1,00	parking facilities	*yes*	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	*yes*	
								1,00	public transport peak	*yes*	
								1,00	local road capacity	*yes*	
		0,365	ECONOMIC SUSTAINABILITY	0,399	LCC COVERAGE	0,500	FINANCEABILITY			*in part*	
						0,250	OPERATING COST COVERAGE			*not enough*	
				0,000	PROFITABILITY					*don't know*	NP
				0,000	LOW RISK					*not at all*	
				1,000	UTILITY					*absolutely*	

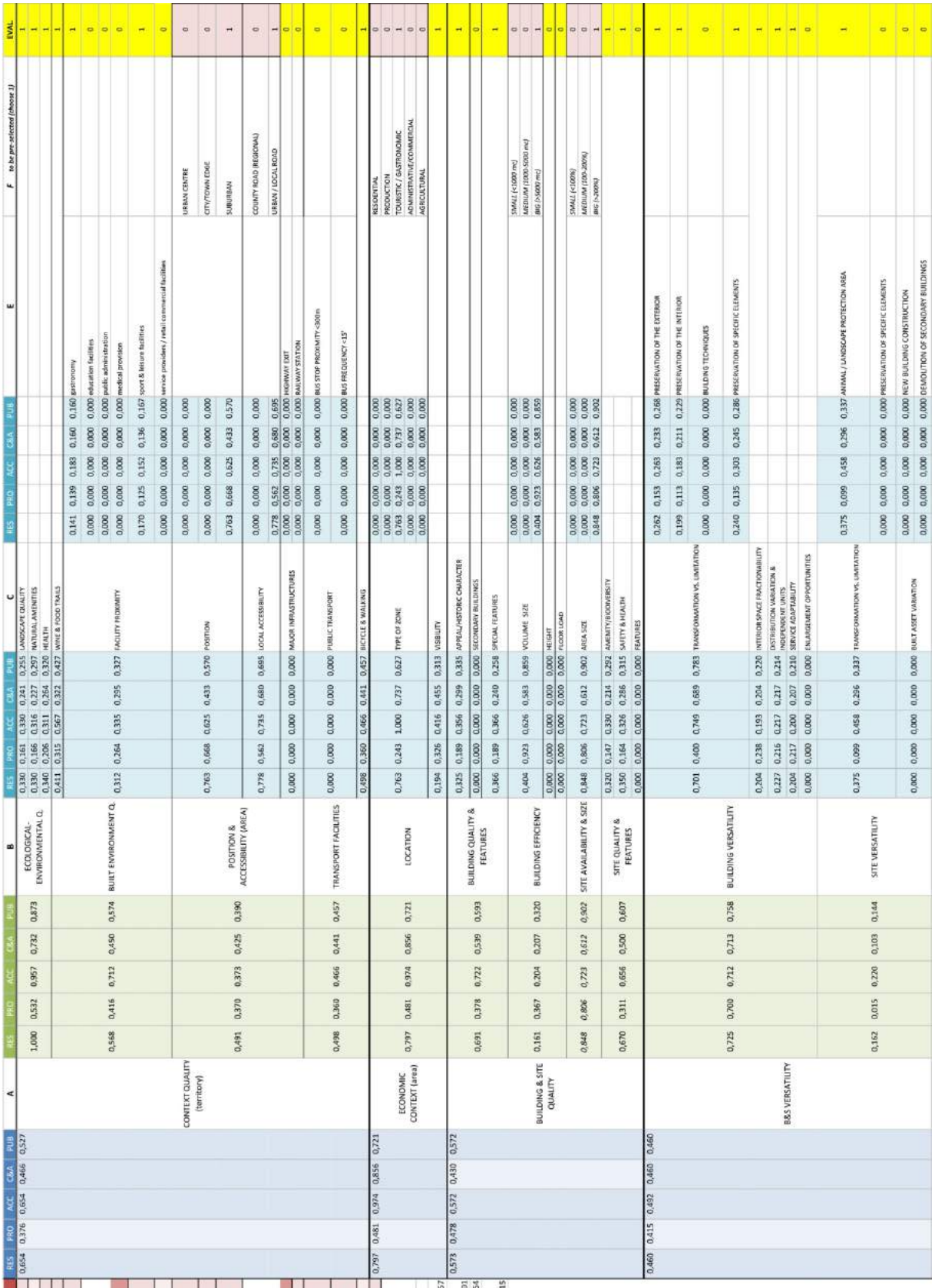
A_VII.4 – Ex O.P.P.: VOC and SUS Models

FINAL RESULT		RES	PRO	ACC	C&A	PUB
	RES	0,554				
	PRO	0,413				
	ACC	0,508				
	C&A	0,504				
	PUB	0,531				
	min w	0,413				
POTENTIALITY						
	RES	0,395				
	PRO	0,266				
	ACC	0,307	0,592	0,427	0,530	0,491	0,527
	C&A	0,408				
	PUB	0,374				
	min w	0,286				
COMPATIBILITY						
	RES	0,465				
	PRO	0,333				
	ACC	0,465				
	C&A	0,346				
	PUB	0,435				
	min w	0,340	0,429	0,347	0,311	0,537	0,471
MINIMUM						
	CQ	0,459				
	EC	0,329				
	B&SQ	0,547				
	B&SV	0,426	0,743	0,539	0,723	0,555	0,711

A	RES	PRO	ACC	C&A	PUB	B	RES	PRO	ACC	C&A	PUB	C	RES	PRO	ACC	C&A	PUB	E	F to be pre-selected (choose 1)	EVAL
							0,000	0,000	0,000	0,000	0,000	LANDSCAPE QUALITY								0
							0,330	0,166	0,316	0,227	0,297	NATURAL AMENITIES								1
							0,340	0,206	0,311	0,264	0,320	HEALTH								1
							0,000	0,000	0,000	0,000	0,000	WINE & FOOD TRAILS								0
													0,141	0,139	0,183	0,160	0,160	0,160 gastronomy		1
													0,189	0,122	0,106	0,120	0,157	education facilities		1
													0,000	0,000	0,000	0,000	0,000	public administration		0
													0,168	0,128	0,146	0,123	0,139	medical provision		1
													0,170	0,125	0,152	0,136	0,167	sport & leisure facilities		1
													0,173	0,125	0,154	0,165	0,133	service providers / retail commercial facilities		1
													0,000	0,000	0,000	0,000	0,000			
													0,873	0,488	0,707	0,529	0,737			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,778	0,562	0,735	0,680	0,695			
													0,194	0,528	0,400	0,313	0,225			
													0,000	0,000	0,000	0,000	0,000			
													0,500	0,418	0,470	0,492	0,508			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,543	0,543	0,557	0,986	0,723			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,404	0,923	0,626	0,583	0,859			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,848	0,806	0,723	0,612	0,902			
													0,000	0,000	0,000	0,000	0,000			
													0,000	0,000	0,000	0,000	0,000			
													0,262	0,153	0,263	0,233	0,268	PRESERVATION OF THE EXTERIOR		1
													0,000	0,000	0,000	0,000	0,000	PRESERVATION OF THE INTERIOR		0
													0,000	0,000	0,000	0,000	0,000	BUILDING TECHNIQUES		0
													0,240	0,135	0,303	0,245	0,286	PRESERVATION OF SPECIFIC ELEMENTS		1
													0,375	0,099	0,458	0,296	0,337	ANIMAL / LANDSCAPE PROTECTION AREA		1
													0,000	0,000	0,000	0,000	0,000	PRESERVATION OF SPECIFIC ELEMENTS		0
													0,000	0,000	0,000	0,000	0,000	NEW BUILDING CONSTRUCTION		0
													0,000	0,000	0,000	0,000	0,000	DEMOLITION OF SECONDARY BUILDINGS		0
CONTEXT QUALITY (territory)	0,592	0,427	0,530	0,491	0,527	POSITION & ACCESSIBILITY (AREA)	0,567	0,503	0,522	0,536	0,485	LOCAL ACCESSIBILITY						COUNTY ROAD (REGIONAL)	0	
																		URBAN / LOCAL ROAD	1	
												MAJOR INFRASTRUCTURES						225 HIGHWAY EXIT		
																		0,000 RAILWAY STATION		
ECONOMIC CONTEXT (area)	0,429	0,347	0,311	0,537	0,471	TRANSPORT FACILITIES	0,749	0,533	0,684	0,677	0,708	PUBLIC TRANSPORT						0,000 BUS STOP PROXIMITY <400m		
																		0,000 BUS FREQUENCY <15'		
												BICYCLE & WALKING								
						LOCATION	0,543	0,543	0,557	0,986	0,723	TYPE OF ZONE						RESIDENTIAL		
																		PRODUCTION		
																		TOURISTIC / GASTRONOMIC		
																		ADMINISTRATIVE/COMMERCIAL		
																		AGRICULTURAL		
							0,000	0,000	0,000	0,000	0,000	VISIBILITY								
							0,325	0,189	0,356	0,299	0,335	APPEAL/HISTORIC CHARACTER								
						BUILDING QUALITY & FEATURES	0,309	0,294	0,253	0,278	0,284	SECONDARY BUILDINGS								
	1,000	0,672	0,975	0,817	0,876		0,366	0,189	0,366	0,240	0,258	SPECIAL FEATURES								
													0,000	0,000	0,000	0,000	0,000	SMALL (<1000 m2)	0	
						BUILDING EFFICIENCY	0,404	0,923	0,626	0,583	0,859	VOLUME SIDE	0,000	0,000	0,000	0,000	0,000	MEDIUM (1000-5000 m2)	0	
BUILDING & SITE QUALITY	0,161	0,367	0,204	0,207	0,320								0,404	0,923	0,626	0,583	0,859	BIG (>5000 m2)	1	
							0,000	0,000	0,000	0,000	0,000	HEIGHT							0	
							0,000	0,000	0,000	0,000	0,000	FLOOR LOAD							0	
													0,000	0,000	0,000	0,000	0,000	SMALL (<150%)	0	
	0,848	0,806	0,723	0,612	0,902	SITE AVAILABILITY & SIZE	0,848	0,806	0,723	0,612	0,902	AREA SIZE	0,000	0,000	0,000	0,000	0,000	MEDIUM (150-200%)	0	
													0,000	0,000	0,000	0,000	0,000	BIG (>200%)	1	
												AMENITY/BIODIVERSITY							1	
	1,000	0,458	0,942	0,734	0,922	SITE QUALITY & FEATURES	0,320	0,147	0,330	0,214	0,292	SAFETY & HEALTH							1	
							0,350	0,164	0,326	0,286	0,315	FEATURES							1	
							0,330	0,147	0,286	0,234	0,316								1	
													0,502	0,288	0,566	0,478	0,554	TRANSFORMATION VS. LIMITATION		
	0,699	0,691	0,687	0,687	0,725	BUILDING VERSATILITY														
							0,204	0,238	0,193	0,204	0,220	INTERIOR SPACE FRACTIONNABILITY								
							0,227	0,216	0,217	0,217	0,214	DISTRIBUTION VARIATION & INDEPENDENT UNITS								
							0,204	0,217	0,200	0,207	0,210	SERVICE ADAPTABILITY								
							0,000	0,000	0,000	0,000	0,000	ENLARGEMENT OPPORTUNITIES								
B&S VERSATILITY	0,446	0,410	0,478	0,444	0,443															
							0,375	0,099	0,458	0,296	0,337	TRANSFORMATION VS. LIMITATION								
	0,162	0,015	0,230	0,103	0,144	SITE VERSATILITY														
							0,000	0,000	0,000	0,000	0,000	BUILT ASSET VARIATION								

FINAL RESULT	SUSTAINABILITY	RES.	SUSTAINABILITY MACRO-	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,740	GENERAL SUSTAINABILITY LEVEL	0,829	SOCIO-CULT. SUST.	0,768	PROCESS QUALITY	0,499	COMMUNITY ENGAGEMENT & VALUES	0,00	public participation	*no*	
								0,75	fulfilment of current needs	*mostly*	
								0,75	respect for people's values	*mostly*	
								0,50	increase of values	*in part*	
						0,766	PUBLIC USE & BENEFIT	1,00	public use and usability of covered areas	*absolutely*	
								1,00	public use and usability of external areas	*absolutely*	
								0,00	employment	*no*	
								1,00	social purpose / mission	*yes*	
						1,000	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	*absolutely*	
								1,00	design innovation	*yes*	
								1,00	construction quality assurance	*many*	
						0,685	MAINTENANCE & MANAGEMENT	1,00	documentation for facility	*yes*	
								0,00	EMS documentation (targets, policy, future improvement)	*no*	
								1,00	maintenance ease and accessibility (systems)	*yes*	
				0,799	CULTURAL HERITAGE	0,787	SAFETY & REGULATORY COMPLIANCE	0,50	accessibility	*in part*	
								1,00	acoustic safety	*yes*	
								1,00	fire resistance	*yes*	
								1,00	hygiene & health requirements	*yes*	
								0,50	structural & earthquake resistance	*in part*	
						0,694	LOW INVASIVITY	0,75	layout type	*mostly*	
								0,25	structures	*not enough*	
								0,75	finishing & decorative elements	*mostly*	
								1,00	technical systems	*absolutely*	
						0,894	REVERSIBILITY & ADAPTABILITY	0,50	structures	*in part*	
								1,00	finishing & protection	*absolutely*	
								1,00	interior partition	*absolutely*	
								1,00	decorative elements	*absolutely*	
								1,00	technical systems	*absolutely*	
						0,933	MATERIAL COMPATIBILITY	0,75	structures	*mostly*	
								1,00	interior partition	*absolutely*	
								1,00	finishing & protection	*absolutely*	
								1,00	decorative elements	*absolutely*	
						0,739	RECOGNISABILITY	0,50	new elements (structure/partition)	*in part*	
								1,00	gap filling / reconstructions (dec.el.)	*absolutely*	
				1,000	USER COMFORT & PERCEPTION	1,000	INDOOR COMFORT	1,00	hygrothermal comfort	*yes*	
								1,00	indoor air quality	*yes*	
								1,00	acoustic quality / comfort / privacy	*yes*	
								1,00	visual comfort	*yes*	
						1,000	PERCEPTUAL QUALITY	1,00	indoor design quality	*yes*	
								1,00	exterior views from inside (perceptual comfort)	*yes*	
								1,00	visual privacy	*yes*	
		0,650	ENVIRONMENTAL S.	0,464	ENERGY EFFICIENCY	0,415	ENERGY CONSUMPTION	0,25	thermal insulation of the building	*not enough*	
								0,00	energy production from renewable resources	*not at all*	
								1,00	technical system efficiency	*yes*	
						0,821	SOLAR OPTIMISATION	0,50	orientation	*in part*	
								1,00	thermal inertia and passive components	*yes*	
								1,00	solar and wind shading	*yes*	
				0,811	ECOLOGICAL IMPACT	0,881	GREEN TECHNOLOGIES & MATERIALS	0,75	reuse of existing material	*mostly*	
								0,00	material certification	*don't know*	
								1,00	durability & maintenance	*yes*	
						0,604	POLLUTION REDUCTION	1,00	low acoustic pollution	*yes*	
								1,00	low luminous pollution	*yes*	
								0,50	low heat island effect	*in part*	
								0,50	waste optimisation	*in part*	
								0,00	rational use of water supplies	*no*	
						0,673	CONSTRUCTION SITE MANAGEMENT	0,50	resource usage	*in part*	
								0,50	pollution reduction	*in part*	
								0,00	waste optimisation	*don't know*	
								1,00	impact on neighbourhood	*yes*	
				0,621	ENVIRONMENTAL QUALITY	0,328	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,00	reclamation of degraded areas	*no*	
								0,00	historical asset and biodiversity	*don't know*	NP
								0,50	ground permeability	*in part*	
								0,50	walkways and outdoor furniture	*in part*	
						0,839	TRANSPORT FACILITIES	1,00	public transport	*yes*	
								1,00	bicycle facilities	*yes*	
								0,50	parking facilities	*in part*	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	*yes*	
								1,00	public transport peak	*yes*	
								1,00	local road capacity	*yes*	
		0,728	ECONOMIC SUSTAINABILITY	0,698	LCC COVERAGE	1,000	FINANCEABILITY			*absolutely*	
						0,250	OPERATING COST COVERAGE			*not enough*	
				0,000	PROFITABILITY					*don't know*	NP
				0,750	LOW RISK					*mostly*	
				1,000	UTILITY					*absolutely*	

A_VII.5 – Vila Vipolže: VOC and SUS Models



FINAL RESULT	SUSTAINABILITY	RES.	MACRO-CATEGORY	RES.	CATEGORY	RES.	ASPECT	RES.	OPTIONS & ALTERNATIVES	USER INPUT	NOT PRESENT
0,734	GENERAL SUSTAINABILITY LEVEL	0,716	SOCIO-CULT. SUST.	0,741	PROCESS QUALITY	1,000	COMMUNITY ENGAGEMENT & VALUES	0,00	public participation	don't know	
								1,00	fulfilment of current needs	absolutely	
								1,00	respect for people's values	absolutely	
								1,00	increase of values	yes	
						0,625	PUBLIC USE & BENEFIT	0,75	public use and usability of covered areas	mostly	
								1,00	public use and usability of external areas	absolutely	
								0,75	employment	some	
								0,00	social purpose / mission	no	
						0,551	PROJECT & CONSTRUCTION QUALITY	1,00	townscape & landscape	absolutely	
								0,00	design innovation	no	
								0,00	construction quality assurance	don't know	
						1,000	MAINTENANCE & MANAGEMENT	1,00	documentation for facility	yes	
								0,00	EMS documentation (targets, policy, future improvement)	don't know	
								1,00	maintenance ease and accessibility (systems)	yes	
				0,554	CULTURAL HERITAGE	0,909	SAFETY & REGULATORY COMPLIANCE	1,00	accessibility	yes	
								0,50	acoustic safety	in part	
								1,00	fire resistance	yes	
								1,00	hygiene & health requirements	yes	
								1,00	structural & earthquake resistance	yes	
						0,435	LOW INVASIVITY	0,75	layout type	mostly	
								0,75	structures	mostly	
								0,25	finishing & decorative elements	not enough	
								0,00	technical systems	not at all	
						0,098	REVERSIBILITY & ADAPTABILITY	0,00	structures	not at all	
								0,00	finishing & protection	not at all	
								0,25	interior partition	not enough	
								0,00	decorative elements	not at all	
								0,25	technical systems	not enough	
						0,673	MATERIAL COMPATIBILITY	0,25	structures	not enough	
								0,75	interior partition	mostly	
								0,75	finishing & protection	mostly	
								1,00	decorative elements	absolutely	
						0,642	RECOGNISABILITY	1,00	new elements (structure/partition)	absolutely	
								0,25	gap filling / reconstructions (dec.el.)	not enough	
				1,000	USER COMFORT & PERCEPTION	1,000	INDOOR COMFORT	1,00	hygrothermal comfort	yes	
								1,00	indoor air quality	yes	
								1,00	acoustic quality / comfort / privacy	yes	
								1,00	visual comfort	yes	
						1,000	PERCEPTUAL QUALITY	1,00	indoor design quality	yes	
								1,00	exterior views from inside (perceptual comfort)	yes	
								1,00	visual privacy	yes	
		0,709	ENVIRONMENTAL S.	0,527	ENERGY EFFICIENCY	0,509	ENERGY CONSUMPTION	0,00	thermal insulation of the building	don't know	
								0,00	energy production from renewable resources	not at all	
								1,00	technical system efficiency	yes	
						0,659	SOLAR OPTIMISATION	0,50	orientation	in part	
								1,00	thermal inertia and passive components	yes	
								0,50	solar and wind shading	in part	
				0,813	ECOLOGICAL IMPACT	0,761	GREEN TECHNOLOGIES & MATERIALS	0,50	reuse of existing material	in part	
								0,00	material certification	don't know	
								1,00	durability & maintenance	yes	
						0,715	POLLUTION REDUCTION	1,00	low acoustic pollution	yes	
								1,00	low luminous pollution	yes	
								0,50	low heat island effect	in part	
								1,00	waste optimisation	yes	
								0,00	rational use of water supplies	no	
						1,000	CONSTRUCTION SITE MANAGEMENT	0,00	resource usage	don't know	
								1,00	pollution reduction	yes	
								0,00	waste optimisation	don't know	
								1,00	impact on neighbourhood	yes	
				0,773	ENVIRONMENTAL QUALITY	0,501	IMPROVEMENT OF EXTERNAL GREEN AREAS	0,00	reclamation of degraded areas	no	
								1,00	historical asset and biodiversity	yes	
								0,00	ground permeability	no	
								1,00	walkways and outdoor furniture	yes	
						1,000	TRANSPORT FACILITIES	0,00	public transport	don't know	NP
								1,00	bicycle facilities	yes	
								1,00	parking facilities	yes	
						1,000	IMPACT ON NEIGHBOURHOOD	1,00	solar potential of adjacent property	yes	
								0,00	public transport peak	don't know	NP
								1,00	local road capacity	yes	
		0,777	ECONOMIC SUSTAINABILITY	0,798	LCC COVERAGE	1,000	FINANCEABILITY			absolutely	
						0,500	OPERATING COST COVERAGE			in part	
				0,000	PROFITABILITY					don't know	NP
				0,750	LOW RISK					mostly	
				1,000	UTILITY					absolutely	