Architecture

Zijlstra, H.; Ribeiro Nunes, B.F.

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MASTERMIND

CRASH

A method to reveal the impact of architectural redesign

edited by Ana Pereira Roders

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Contents

CHAPTER

4

Architecture

by Hielkje Zijlstra & Bruna Nunes

Introduction

Example of analyses of eight department stores in the Netherlands in the HA graduation Studio Vacant Heritage 2020-2021. The elements of the façades extracted. Spatial Building Typology, (Zijlstra, ea 2021)

In the Mastermind Crash course, buildings are analyzed on various aspects, in particular looking at the impact and (measurable) results that the interventions in the building have had. Much of the built heritage is vacant, requires a re-use or the current use requires an update. This causes buildings to change. At Heritage & Architecture we want to make students aware of the impact these changes have on various aspects that play a role in this. This chapter is about architecture. Architecture is a broad concept. That is why we have focused on a limited number of aspects: space, connections and details. So, three scale levels are included in the analysis. A value assessment can be made on the basis of various methods. This is explained and illustrated in this chapter with a lot of examples. This judgment is placed in the framework of the Mastermind Crash course, after which an evaluation and comparison can be made of the change of the building at the moment and with respect to the building in a previous phase of life with the focus on Architecture.

The idea behind the three dimensions of analysis, is that you look at a building not just as an object, but essentially as a living element that relates to the surrounding space, that has its own details proving its uniqueness and that all these three dimensions are influenced by the purpose for the use or the redesign of the building. The building's AR-DNA is an important factor to take into account to try to understand the building itself. The before and after situation always depends on the character of the original building.

The total overview of insights provided by this exercise results in a collection of practical examples that serve as learning material for architects in training. Architecture is an essential part of the assessments addressed by the Mastermind Crash course and, by studying examples and appreciating them, it will contribute to a design vocabulary for the redesign of existing buildings with respect to their heritage values.

Define

Definition

To start off the Mastermind Architecture it is crucial that we find a definition of architecture that corresponds to the specificity of the domain that we are seeking to further analyse.

Architecture is looked at as *"1: the art or science of building specifically : the art or practice of designing and building structures and especially habitable ones"* (Merriam-Webster Dictionary); in other definitions, more poetic, architecture is *"above all, a service. It's a service oriented for well-being. The objective, the first preoccupation, from architecture is to create better conditions, in the city, in housing, in equipments."* (Álvaro Siza Vieira)

However, what we intend to classify as architecture for Mastermind, is everything that, of the building, is inherently related to its DNA, whether it is its original DNA or the new 'AR-DNA' - Architectural DNA (Foqué, 2010) -, achieved through changes that we consider to be contributing to the formation of a new existence of the building.

In this domain, architecture will be taken as *"everything which is inherent on the DNA of the building that, independent from the opinion, will always be there and always be there and is the soul of the building (or 'the being')"* (Pereira Roders & Zijlstra, 2020), meaning the basic nature of the building, its soul or qualities.

Challenges

One of the main challenges in analysing architecture is to learn how to interpret different approaches and design results in built objects regarding interventions in existing buildings over time. We can consider these approaches as either referential contrasts or extreme contrasts (Bloszies, 2012).

Taking two examples to portrait the different approaches, and illustrate these two concepts, we can analyse the Neues Museum in Berlin and the Harbour Office in Antwerp.

As an example of a referential approach, the intervention on the Neues Museum, in Berlin, shows a care bringing back the original appearance of the building, as much as possible, after the visible destruction. It is not an absolute mimicry, given that the difference in material and in the subtlety of details and shapes, smalls differences are revealed in relation to the original model.

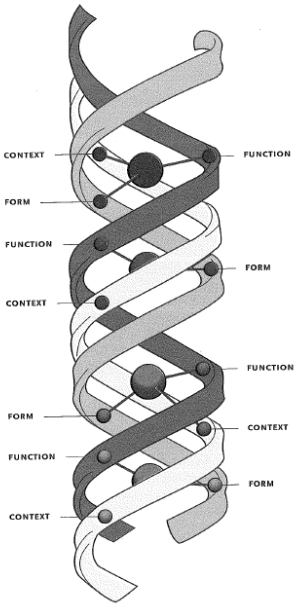
Neues Museum Berlin, 1843-1855 Friedrich August Stüler; 1999 – 2009 David Chipperfield.

In the case of the Harbor Office, in Antwerp, the relationship between new intervention and re-existence is an extreme contrast approach. There is neither the search for an adaptation of material, nor of shape or proportion. The new part is almost overwhelming the old building.

Harbour Office Antwerp, 1922 Emiel van Averbeke; 2007-2016 Zaha Hadid.

Deconstruction

Based on the system theory, Foqué explains that "*a whole, is defined not only by its individual elements but also by their interactions*", therefore we have a system emerging every time single parts [or elements, f.i., building elements] come together to form a structure. (Foqué, 2010) We consider this to be relevant as the architectural inquiry, based on research by design, focuses on both the tensions between objective observable facts/subjective value judgement, and the active intervention where the perceived structure of the design context gets altered or intervened. (Foqué, 2010).



Architectural DNA explained by Foqué.

The objective of the architecture domain is to determine the impact of change at an architectural level, but it is also a fact that there is a lack of frame of reference to compare, evaluate and appreciate buildings, as well as the absence of a solid set of criteria to pursuing this task (Foqué, 2010). To compete with this idea, we have also to think that in a last case scenario, the contents of the reality are the *a priori* (the frame of reference) for what Alberto Perez-Gomez calls a "*truly meaningful architecture*", that lays hidden beneath "*a thick layer of formal explanations*" (Perez-Gomez, 1990).

While discussing the "*Building Genome*", Foqué proposes that "*knowledge pockets*" carrying data about a certain building, are associated with three main domains responsible for defining architectural designing-building problems: the functional domain (related to *utilitas* and *firmitas*); the formal domain (related to *venustas*) and the contextual domain (related to the environment in which the building exists or will exist), forming an analogy with *"the way natural life functions and evolves via its hereditary material"* (Foqué, 2010).

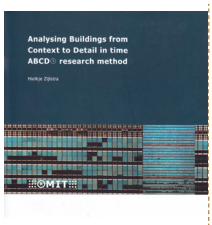
Taking Foqué's three domains as examples of an holistic approach to architecture analysis, we suggest that three dimensions of interpretation are used to obtain an analysis that is transversal to the entire dimension of the building: (1) Connections), (2) Space, (3) Details.

The option to use the nomenclature from the DQI (DQI, 2018) is justified by the simplicity with which information related to this category of analysis can be found. In other words: names similar to those of the DQI are used so that the information is easily located.

At CONNECTIONS, we include the site analysis as well as urban – landscape – entrance – closed/open – views, etc (f.i., for Clark, even structure and access should be interpreted as potential AR-genes (Clark, 2018)); by SPACE, we mean interior – exterior – form – geometry – scale – proportions (etc); on (3) DETAILS, you can include indicators such as construction – connections – materials – texture – smell.

It is rather important that a strategy for linking all three dimensions is found while analysing the building and its qualities, and further in this text, you'll find examples of how to strategically link the three dimensions.

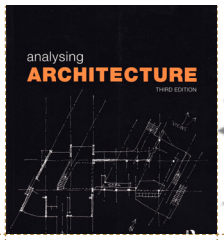
General Methods



Hielkje Zijlstra: Building factors and elements over time

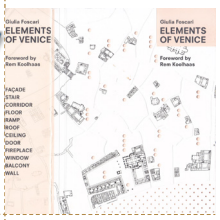
Design Quality Indicator

Design Quality Indicator: Design Approach-based



Unwin: Architectural object

Kano Model: Client/User experience-based



Foscari: Building parts related to urban context

There's a variety of analysis and evaluation methodologies available. While some are more oriented towards user-experience (as is the case of Kano), others will focus on more factors and elements and parts of the buildings. We are interested, however, that through the chosen methodology, the building as a single entity is considered as much as possible.

While in most methods applicable to other domains, we easily see both a qualitative/quantitative approach, the architectural assessment, isolated, tends towards a more descriptive approach and therefore, a qualitative approach. In methodologies that are more oriented to the practice of architecture, we can observe two types of results or data to be analysed. Even though it is a tendentially descriptive approach, and therefore, which develops in a qualitative process, in this descriptive process we can observe the distinction between what would be desirable and what would be most inspiring, and it is still possible to assign levels of classification to the interventions.

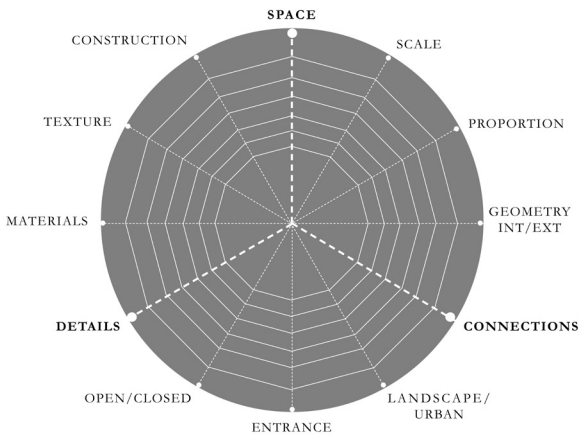
2021 Method(s)

Given the qualities of the methodologies presented, the methods chosen for the 2021 edition of Mastermind are the ABCD method of Hielkje Zijlstra and the DQI (Design Quality Indicator) method.

ABCD method	DQI method
Categories: - **Indicators**: - **Parameters**: not detailed **Context**: Practice oriented. **Target**: new building and existing buildings (refurbished). **Aim**: "evaluating and trying to understand the building's DNA and the evolution over time before they will be redesigned for updated use or re-use" **Approach**: design quality-based. **Process**: qualitative. **Type of Information**: descriptive.	**Categories**: 3 **Indicators**: 10 **Parameters**: not detailed **Context**: Practice oriented. **Target**: new building and existing buildings (refurbished). **Aim**: "evaluating and improving the design and construction of new buildings and the refurbishment of existing buildings" **Approach**: design quality-based. **Process**: qualitative. **Type of Information**: descriptive (desired/inspired); scores (0-6)

Both methods are related to building factors, design quality (design-quality approach) and observe the building as a whole, and architecture as a balanced system. Although in the Design Quality method a holistic analysis character is observed (and, therefore, including categories that include economics, etc), the basis of the two approaches is the physical part of the construction, the tangible part and, therefore, the one that more directly approaches the issue of AR-DNA.

Thus, it is expected that these two methods can be used in a complementary way for a more operative and objective approach, avoiding analysis overlaps with other domains. It is rather relevant in this phase that students keep in mind that, while studying a domain, one is contributing for a more complete overview of a building, so to respect the boundaries between domains is not a restrictive action, but a strategic one.



Adapted DQI/Zijlstra Design Quality Spiderweb (Zijlstra, 2020)

This is an example of what can be a set of indicators to apply, the main indicators being connections, space and details, which can be used as secondary indicators. However, the group of sub-indicators remains open, so that the student can attach to the list sub-indicators he considers most relevant after an introductory analysis of the building.

As an example of this, one of the last year's works, from Diana Ugnat, is very expressive example of an adaptation in the indicators spiderweb (to be consulted in part "5.3. Analysis/Method").

Selected indicators

Using the definitions in the DQI method, connections (urban and social integration) are understood as being "*concerned with the relationship of the building with its surroundings*"; space is perceived as "*about the size (in three dimensions) and interrelationship of the building's rooms or component spaces*" or as "*the functions it may accommodate originally and in the future*"; and **details** (form and materials) "*is concerned with the building's physical composition, scale and configuration within its boundaries*" (DQI, 2018).

To help understand the concept behind these definitions, students can address questions to the indicators themselves, such as: (connections) at what level is this building connected to the surrounding area? Is it visual? Is it physical? Is it social-related?; (space) What evolution can we identify in this space typology? Is it about the dimension? Is it about the relation between areas?; (details) What is the uniqueness of these details? Beyond form and material, how does the detail information contribute for a unique AR-DNA?

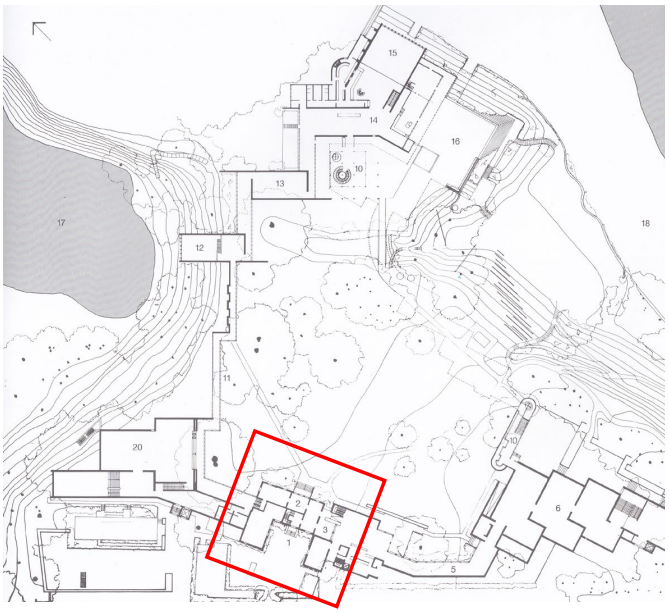
Otherwise, we can define the objective of the architecture domain by the main indicator as:

Connections: not only about accessibility, but rather about how connections to the site make the building belong to the site and internalize the site references; (space) the capacity of space to change completely, not so much in function but mainly in shape and atmosphere; (details) the extent to which a detail in a material can impact the perception of the building and the perception of its purpose.

Examples:

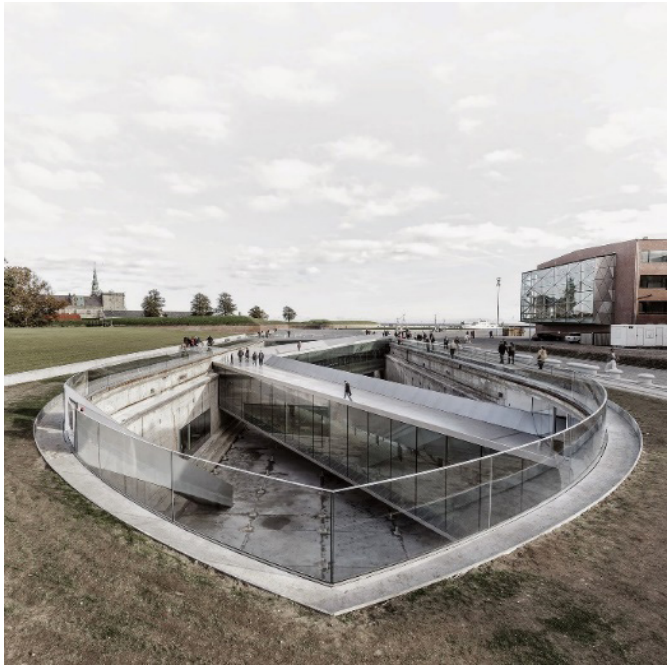
(1) Connections.

Connections: Louisiana Museum Humlebæk extended in 1958 by V. Wohlert and J. Bo.
Views, space and landscape are one composition (Zijlstra 2017)



Louisiana Museum Humlebæk extended in 1958 by V. Wohlert and J. Bo.
Marked red: the Original Villa.
(Bo, J and Wohlert, V. Louisiana M useum Humlebæk, Berlin, Wasmuth 1993)

(2) Space.



Space/exterior: BIG Danish Maritime Museum Helsingør. Museum created in a ship dock. (https://visuall.net/2013/10/18/danish-national-maritime-museum-by-big/)

Space/interior: Church becomes Hotel Restaurant Bizar Bazar, Arnhem (Zijlstra, 2019)

(3) Details.

The Dresden War Museum is a good example of how the transparency of the material is essential to understand the impact of the statement to show the destruction of war.
Details: Dresden War Museum, Daniel Liebeskind 2011 (Zijlstra, 2017)

Collect

Definition

*"The concept of '**context**' is also considered in the method itself, and the structure of the research and investigations. By **analysing the context we can define the area being investigated**. We start by broadening the perspective of the investigation and then develop it in depth. When dealing with an existing building which is to be changed, **the building sets the context.**"* - (Zijlstra, 2009)

It is crucial that students put architecture into context, so a particularly important feature of data collection for assessing architectural impact is that architecture is thought about as the product of its context or/and as the starting point for a new context.

In terms of architectural impact, it is relevant to state that it is not enough to observe the building exclusively and automatically conclude that, if there has been a change, there is a positive or negative impact. The collected data does not automatically originate the assessment. Instead, it is reflected in the collection of relevant information to be able to make the final weighting on the impact of a change on the building.

This collection of information, if done before the intervention, is useful in the sense of understanding what can be changed or what should be highlighted in the final proposal; if done after the intervention, it will be useful to weigh the contribution of this change to the new life, or the new AR-DNA of the building.

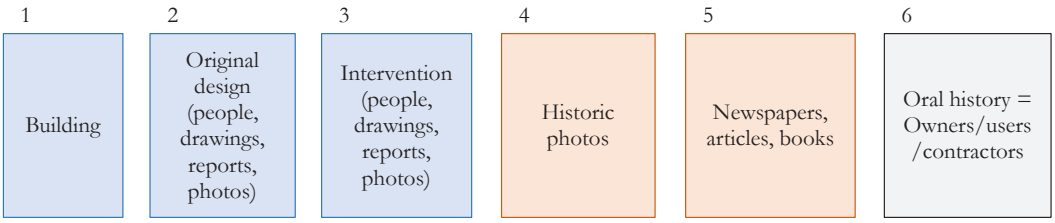
Sources, primary and secondary

The primary sources for assessing the impact on architecture is the building, and the objective is to confront the old self of the building, with the current situation. In other words, to compare the old AR-DNA and the new AR-DNA. From there, after a 1st visit/or evaluation, the consultation of other sources follows, to complement the information that you gathered on site. Especially, if the changes caused by the intervention are recognizable in the final project/final state, it will be interesting to know in detail what was removed or modified that generated a new conception of Connections, Space or Detail.

In this sense, there is a considerable variety of sources that can be consulted, from documentation referring to the original version of the building, architectural archives, photographic archives (primary sources), to literature, historical photographs, newspaper and magazine clippings of the time, interviews, social networks, and even, the collection of testimonies of the inhabitants/users themselves (secondary sources).

Bridging past and present involves some challenges when collecting data. The past is challenging as you can't visit it, so you can only trust in the original drawings and documents to tell the story. At the same time, you must rely more on the user's feedback before redesign or publications that tell the story of the "before". Thus, it is important to visit the building as many times as needed, and that it is looked at from the inside out, and outside in.

A coherent strategy could be:



(Primary; Secondary, tertiary.)

Nevertheless, in some situations you might encounter some difficulties gaining access to information, so it is always possible to approach the data collection process in a different order, if you keep trace of the information, its origin and, therefore, its value or trustworthiness.

Data

Everything that can be collected has the potential for being converted into useful data. It is rather important that a strategic thought is kept throughout the entire process and that the transition between scales of analysis is kept in mind: zoom out (connections) > object (space) > zoom in (detail).

When possible, students should be able to work with both qualitative information and quantitative information, as it is a more reliable way to assess impact. But it is also true that between this step and the following steps, it is easy to overlap the concepts since in the collect phase, it is intended that they simultaneously observe the data/ information and the description of the available material, and in the classification is carried out simultaneously with the description and identification of the content.

Nonetheless, what will determine the success of the analysis is that you reach to comparable data, that allows you to compare the before and after in every aspect that your analysis is focused on.

Connections	**Space**	**Detail**
Historical layers	Concept	Structure
Stories told	3rd Dimension	*Construction*
Urban & Landscape	*Proportions*	Services
Climate	Typology	Comfort
Structures	*Geometry int/ext*	*Materials*
Scale	Building parts	Joints
Zoning	Functions	Texture
Access	Organisation	Sound
Open & closed	Atmosphere	Smell
Views	Light	Colour
(Zoom out)	(Object)	(Zoom in)

Diagram after Zijlstra lecture: Analyses of Buildings MSc Heritage & Architecture, April 2020.

General Methods

Taking as an example the DQI stages, they focus an entire and more complex process that goes from the stakeholders to the user's feedback. This adds different contributions to reach the final comparable scores. According to the DQI method, to fulfil these stages (Briefing > Design > Design > Ready for Occupation > In Use) 5 steps need to be taken into consideration:

- Interpret the project's original documentation.
- Interpreting the stakeholders' aspirations.
- Experiencing and observing the building.
- Experts' feedback.
- People's feedback.

In other words: always focusing on the before and after the renovation, the work is done by complementing different scales and types of analysis: before/after, documentation/local-field, primary/secondary sources, individual perspectives/groups (varied perspectives that can be triangulated), documents/own observation.

Another interesting method that could complement the DQI and the ABCD methods, is the Haussmann method (Jallon & Napolitano 2017) as it focuses both in the object (space) but also in the location itself. This method also involves using the same approach of analysis for every aspect of the building through (1) reduction drawings, re-drawings and mapping, (2) text blocks to introduce and explain every aspect to be analysed and (3) diagrams.

To have this said, does not exclude that students get to know other methods researching, analysing and evaluating the spatial qualities of buildings. Some other references are Einsenmann (2003, 2008), focused on individual buildings, Radford (2014), focused on understanding the building through a simplification in drawing techniques or Haraguchi (1988) who focuses on the total comparison of aspects of all buildings.

Method

For this year's methods, we have chosen something more specific that incorporates both the features of ABCD and DQI methods, while incorporating the strategies referred in the Haussmann, Radford and Haraguchi methods. The strategy for combining these approaches is through:

1. Reading the building in **relation** with its context:
2. Reading the **contribution** of the building for its context;
3. Interpreting and "understanding the **building as a context in itself**".

While doing this (focusing, ordering, selecting) you must follow the rule of reducing, redesigning and relating information by focusing on your specific question or topic as

well as registering what information you have available for each indicator, keeping trace of the collected information and, especially, using information collected and/or produced by you. It is relevant that you adhere to visual, descriptive and quantifiable information.

At the same time, it is necessary that the information is comparable, so it is important that data related to the same indicator/sub-indicator exists both for the before and after, and that all materials are redrawn in the same way, when possible.

So you need to address four main steps:

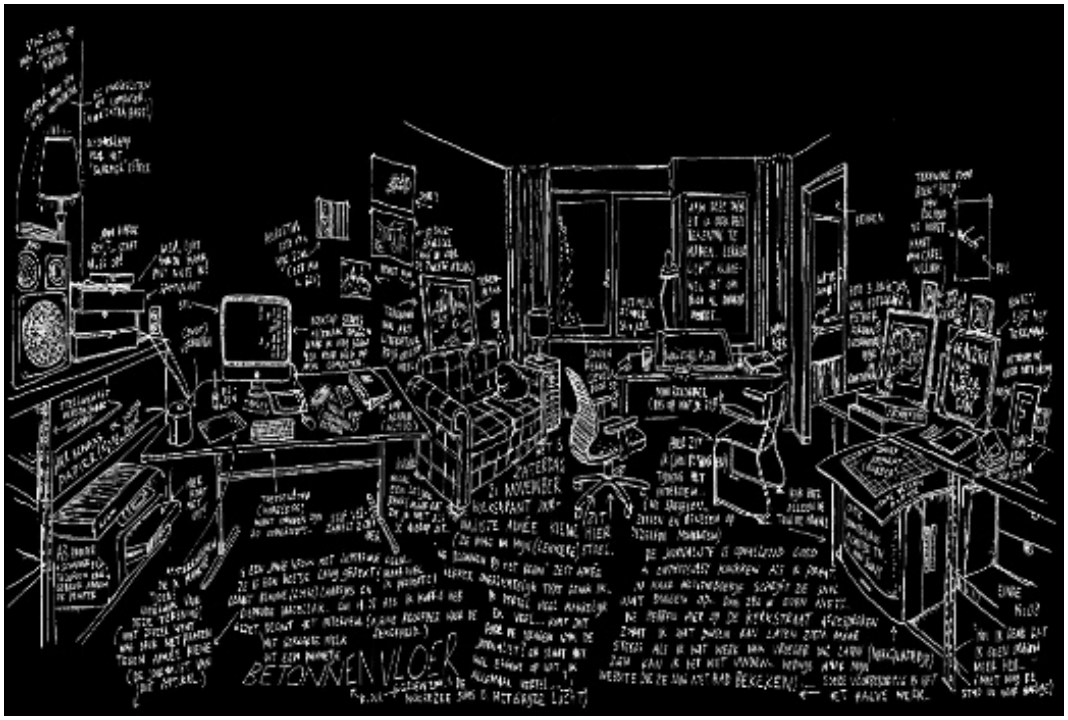
1. the location; 2. the building aspects; 3. Diagrams; 4. Comparable schematic results for comparative assessment.

Historical Develepment of the V&D departement store in Alkmaar Redrawn for the Spatial Building Typology research. (Zijlstra, ea, 2021)

Indicators

Apart from the regular plans, sections and schemes, you have to ask yourself what you need to assess the impact of change in terms of connections, space and details. Taking Emeline Lin's PhD research as an example, it is without too much effort that she goes from the zoom out scale to the detailed scale in the same drawing, many times taking as the starting point a single element and relating it with its context, natural or new context.

(1) Connections (zoom out)



Jan Rothuizen: Zachte atlas van Amsterdam

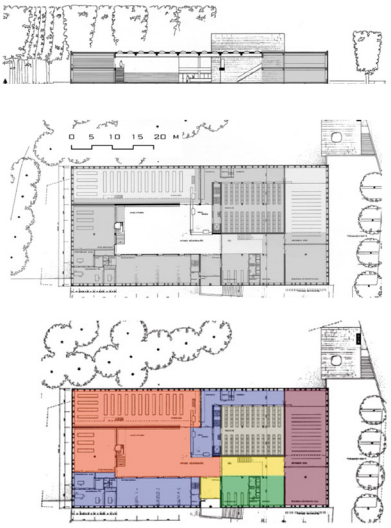
Lin, 2017

Lin, 2020

(2) space (object)

Students must interpret the building and the materials available in such a way that you create some content of your own, by simplifying the data and cleaning the unnecessary information, or by adding information that is not evident enough in the original drawing but is relevant for the analysis being conducted on Mastermind.

On the other hand, it is rather relevant that you think as architects, and not focus on, f.i., a plan just as a flat element or merely functional schemes. Looking at the section and plan of the Provincial Library in Leeuwarden with the heights of the rooms indicated by shades of grey (the lighter the shade, the higher the room) and the same plan with the functional characteristics in 1960.



Jan Provincial Library in Leeuwarden. In colour the different functions located in the floorplan, in grey scale the different floor heights in the floor plan. (Zijlstra, 2009)

(3) details (zoom in)

Zooming in into a detail (either it is a constructive detail, a material, texture, etc) is important, also, that you specifically locate the detail and mark its relation to the entire building and/or external reference (if it exists). As explained before, it is not forceful that you refer to body-related or visual connections but it could be, for instance, that this details participates in a larger narrative, technical wise or social wise.

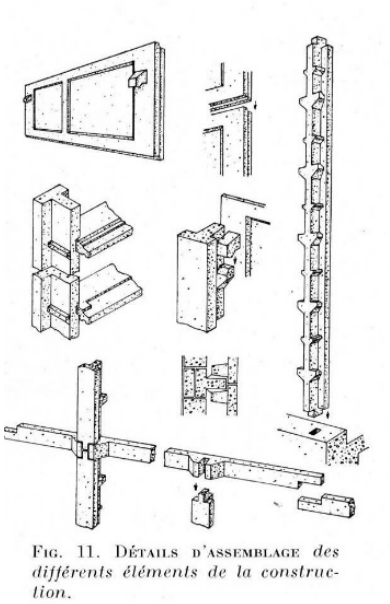


Fig. 11. Détails d'assemblage *des différents éléments de la construction.*

The prefab concrete structure of the housing blocks in Jeruzalem Frankendaal Amsterdam. The structure forms the basis for the floorplan and section. (Zijlstra, 2009)

Classify

Data Analysis

While analyzing data, the classification process is intricately linked to the collection process (collect), since in the organization process you might notice that there are elements missing. Both in architectural analysis and in data classification, you'll be comparing and stripping the building's layers of time, until you find a comparable basis between the after and the before redesign.

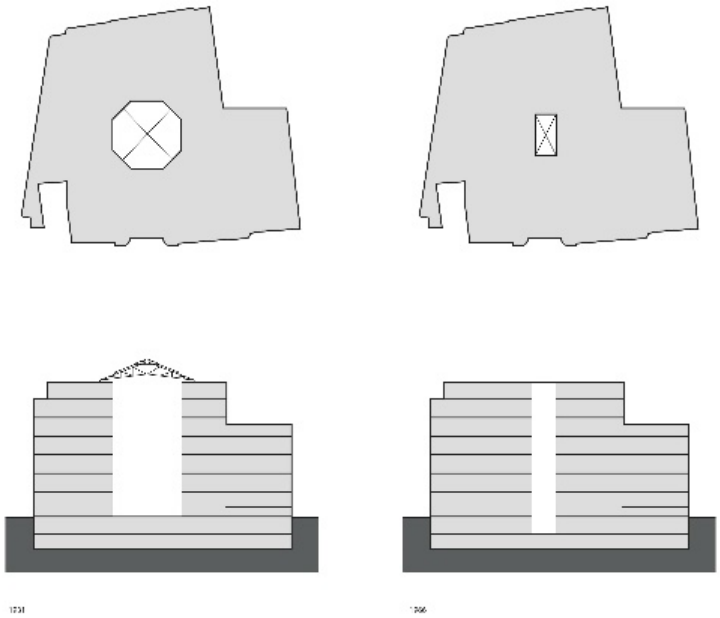
How to classify data, in the architecture domain?

There are bilateral relations between the chosen indicators and the building. There's also a continuous influence between the buildings, the methods for data collection (collect) and the methods for analysis (classify, analyse, assess). Although we have referred to some of the analysis methodologies earlier, they relevant already, once the methods you apply for analysing, imply a certain strategy for collecting the data. This influence or shape each other. It may happen that when visiting the building, or consulting the documentation, another indicator seems more appropriate, or that a chosen indicator may benefit from an innovative perspective taking as a case study a single element or characteristic of the building, performing an analysis that focuses only on one element and uses this element to go through the three proposed dimensions. To achieve this level of clarity, it is, of course, important to ask what data is needed to understand the chosen indicators, and what data is missing to analyze the change.

The collection of material must be strategic. You can collect as much material as you can, but never assume that you will use it all. Students must be prepared to choose what data stays for analysis and what data is put aside. On the other hand, having collected material that does not fit your domain, that material may be useful to a colleague from another domain. Remember that you work as a team and it is wise to help each other to reach a set of information that, being cohesive, will also lead you to a cohesive result in the end. Each of these domains contributes to a result that must reveal the transversal aspects to the different domains.

The combination of sources is essential for a complete and informed study. Thus, for the before and after phases, different sources of information (visual, textual, oral, etc.) can and must be associated. Then, assign function to the elements: create a code that allows you to understand the extent to which a source can be used, or reflects information that is of interest to your analysis.

Remarks on data classification:
- Bilateral influences (indicators-**building**-indicators). - Keep the focus on simplifying information (by redrawing and/or schematize). - **R**educe, **R**edesign, **R**elate information (just as explained in the "3. collect" methods) - Redrawing or doing own schemes, diagrams. - Classifying the data according to the indicators it "talks about".
Classify according to indicator, phase or content.



V&D Haarlem, before and after removing the big courtyard (Zijlstra, ea 2021)

Theoretical Framework

It is important to classify the information by types of characteristics associated with the building, or the type of attribute under study. Whether it is the students' approach to follow materials, finishes, relationships between building and surroundings, etc., then there will be an evaluation of these selected characteristics according to the chosen indicators. Using simple classification methods, we will be asking questions about the essence of the elements that we have collected and later, we will be taking notes that help us include these elements in a narrative and an analysis of our own.

You must relate the research approach, results and findings to what has been done before and add knew knowledge to this. Based on methods and theory mentioned before you are invited to build up the theoretical framework of your research.

First, we will make the classification based on the characteristics of the building and then assess them according to the selected indicators.

For example:

CONNECTIONS	SPACE	DETAILS
"is concerned with the **relationship** of the **building** with its **surroundings**" (DQI, 2018)	"is about the **size** and interrelationship of the building's rooms or **component spaces**"; "the functions it may accommodate originally and in the future" (DQI, 2018)	"is concerned with the building's **physical composition**, scale and configuration within its boundaries" (DQI, 2018)
Visual: inside-outside, Inside-inside, long-distance, skyline analysis. Physical: direct (door), indirect (window), none (no doors or windows). Urban-scale: "how many houses with the same colour type material in the area".	Typology: "number of same type spaces", "number of roofs with the same form". Dimension: areas, internal space heights. Form: external, internal. Adaptation: expanded, moved.	Material: type; texture; **colour**. Detail typology: **door** types, door colours, door shapes, door sizes; **window** types, window frame colours, window frame materials.

And also you also must take into account that both genotype and phenotype are relevant for the analysis, both being distinct parts of the AR-DNA of the building. The phenotype being the DNA part connected to manifestations, stories and cultural significance (Clarke, 2018), and the phenomenon being interpreted as the relation between human daily life and the building/city and how it affects the DNA of the building itself. This means that even the parts of the building that seem to be relate exclusively to physical and technical aspects, could have hidden 'layers' that connects it to broader understandings of architectural impact.

Methods

*"A careful and **creative analysis**, **combination** and **interpretation** of the information will enable us to make **discoveries** which can be used to design and redesign the assignment, and for other projects."* - (Zijlstra, 2009)

While making good use of the methodologies introduced to you in the previous segment, the analysis implies that you permit your creative mind to combine and interpret data in a way that allows you to make new discoveries.

The typification (even within a category) is also a relevant approach. Clarke states that considering the possible different types of intervention that an element has undergone over the years, a particular element can be transformed into a hybrid element, so it must be typified independently (Clarke, 2018), although with some form of reference to the original type that preceded it. One example of that, could be the structure of a building, or a material that has been changed/mixed.

Keeping the comparison between the before and after the redesign, you must make a note of the existing differences, as we said earlier, in order to keep the material comparable. Using the code referred to in the previous segment, the purpose of

classification is to assign a word or phrase, which symbolically attributes to a portion of the data an attribute, a summative, salient quality and reflects the essence of the information or the value of that data.

Here're some examples of possible approaches in assigning a classification to elements according to the indicators under study. In every case, a single attribute/ characteristic was the original focus, but what we want to show you is that the same aspect of a building can provide different readings on a variety of different (sometimes, associated) aspects:

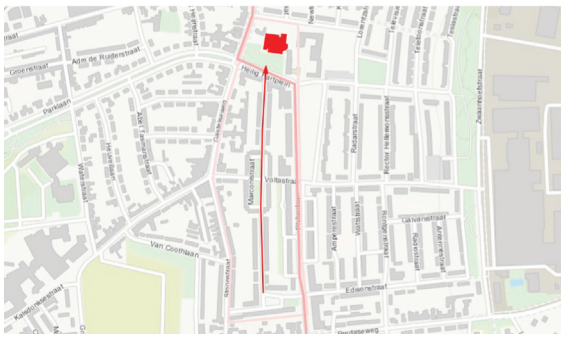
Case study 1: Heilig Hartkerk, Roosendaal, (by Boel, Groen, Muilwijk & Kas, 2017)

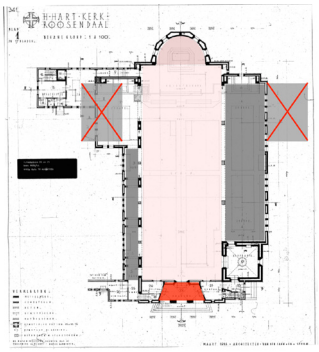
Indicator: connections / visual (long distance)

space / form

connections / physical (int-ext)

connections / visual (int-ext)

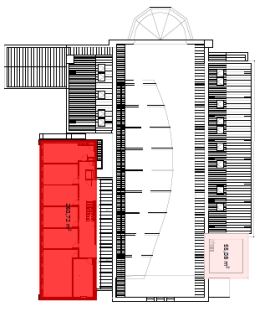


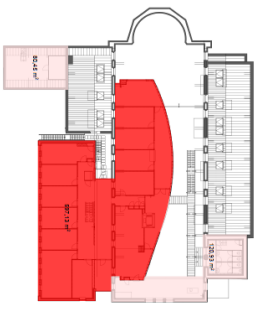


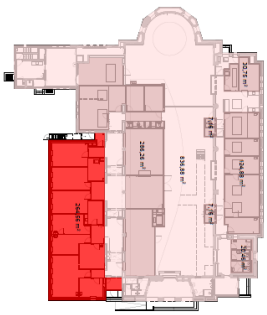
Before

Although the objective of the students was to focus on a physical connection, this type of reference could also be used to refer to visual connections, or context-

After







Case Study 2: St. Anna Church, Breda (by Burgers, Jonge, Mercan, Rutten & Smits, 2017)

Indicator: space/typology

space/dimension-volume

space/elements-stuff

connections/visual int-int

space/dimension-volume

space/volume

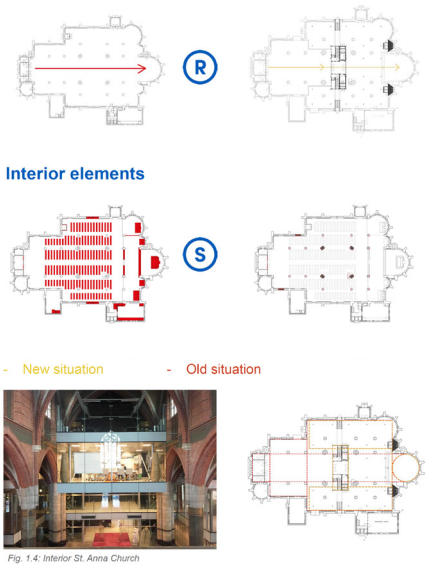
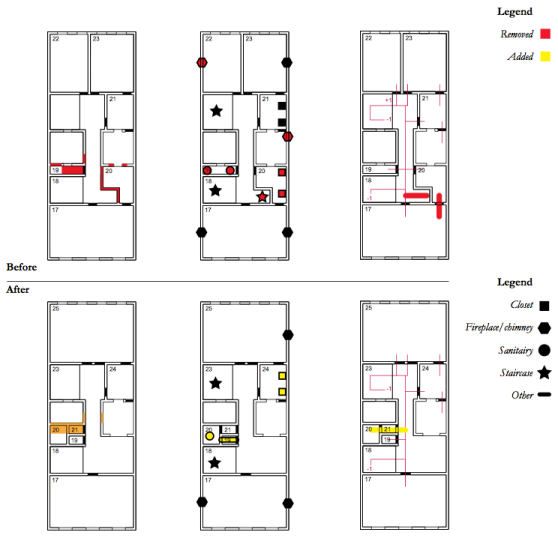


Fig. 1.4: Interior St. Anna Church

Case Study 3: Herengracht 448, Amsterdam (by van den Berg, 2013)

Indicator: Space/Elements



Indicator: Space/Areas

Case Study 4: Edinburgh #1 (by Bennink & van Niel, 2013)

Indicator: Space/Object's form

Space/ Object's façades

Details/Window frames

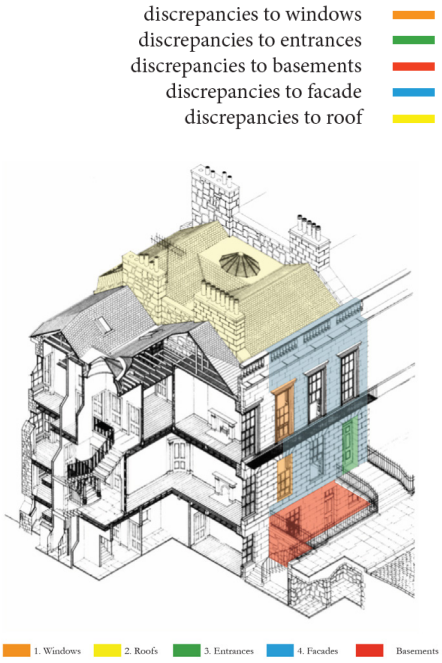
Details/Roof typology

Details/Roof materiality

Details/Material color

	Windows	Entrance Areas	Facades	Roofs
Typology	Sash and Case, the number of panes depend on the age of the building	Entrance is approached by plats with railings oversailing basements	Palace-fronted block facades in neo-classical style	Pitched, m-pitched in the older buildings
Building material	Wooden frame and astragals. Single glazing from Crown Glass	Wooden doors, stone plats, iron railings and ironmongery	Local sandstone. Attached attributes are made from iron	Local slate
Paint	White painted window frame, astragals and shutters	Doors can be painted in any colour, railings are painted black	Stones should not be painted. Downpipes and balconies are painted black	Not applicable
Appropriate attached objects	Shutters on the inside	Appropriate ironmongery	Downpipes and balconies	Chimneys and parapets. TV antennas and roof windows are accepted

Figure 1.6: Levels of Acceptable Change, based on the Building Attribute Matrix



Indicator: Details/Materialcolor

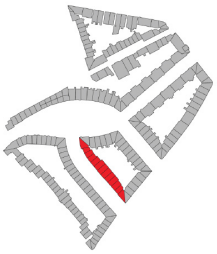
Indicator: Details/Window frames

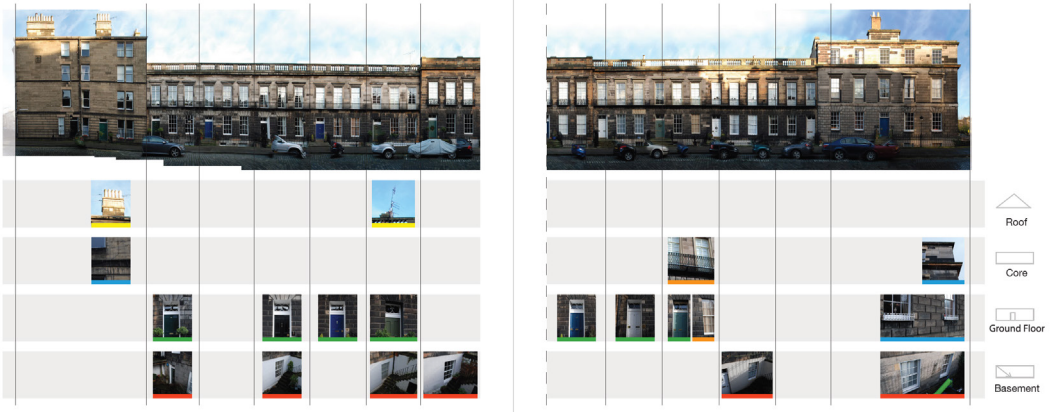
Indicator: Details/Material

Indicator: Details/Color

Indicator: details/colors

Indicator: connections/urban scale





Map 5.4: Painting of entrance areas in the research area

Map 5.5: Painting of basement areas

Analyze

Data Analysis

Data analysis in architecture is, in a very simplified way, a comparison between the before and after re-design and the consequent revelation of the impact in the difference between these two phases.

We can anchor this analysis on concepts such as scale (building, component, material); or in terms of the type of analysis we are going to apply; in terms of the indicators we intend to study.

At this stage, two questions have to be addressed as a final step before starting the analysis and the impact assessment:

1. What data do I need to analyze change in these specific indicators?

2. What data is missing so I can analyze the impact change?

Theoretical Framework

"*Similarly, one can look at architecture in a series of sliding scales that **interrelate to one another**. (...) within a context: separate tools or analytical enzymes for a **unified analytical whole**. Acting upon the building using the separate acts allows the architect to diagram **one particular aspect**, to understand that aspect and then see how it is **part of a larger holistic vision**. (...) the intention is for the architect to examine the **pieces**, see the **overlaps** and discover the **holistic form**.*" - (Jenkins, 2013)

Taking Jenkins' quote as a guideline, the option of selecting three main-indicators to which sub-indicators can be associated (directly related or not), the most interesting and practical option would be that the three indicators could originate a holistic perspective around the whole building and its links to a more remote scale (the scale of the connections, and other domains, as well). As Jenkins says, looking at architecture as scales that inform each other to form an analytical whole, in which a very specific aspect will actually participate in a broader view, examining the pieces, finding the overlaps between the three scales in question and discover the contribution of the specific attribute or element to the building's holistic shape. This extremely specific aspect could be a single detail, if you find a way to interrelate the three dimensions (connections, space, and detail).

After having created a solid amount of data, already classified and simplified, you can start analysing the redesign. One interesting approach is to follow Turner's framework, through which you must find the aspects where, comparing the before and after the redesign, the element/s under study shows the identity of character, similarity or difference.

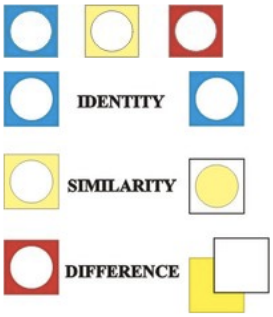


Fig 10.4 Possible contextual relationships between context and development

Possible contextual relationship between contex and development (TURNER, 1998)

You must visualize the change in terms of what has been removed, added or maintained and assuming the possibility, furthermore, of witnessing the transformation of an element, simultaneously, by removing and adding parts while keeping the same character.

Methods

For assessing the impact of change, it is important that the motive for the change is considered, meaning if the change in the architectural level is, f.i., related to a need or its readaptation to a new reality, or if there is, of course, a desire to break with the pre-existing situation. The reason behind the change can act as an aggravating factor or as a mitigation of the impact of change. After this analysis, the change is assessed.

In the analysis of architectural change, it will be understood, then, that both the actions taken at the pre-design level (what has been removed and maintained) and the actions at the design level (what has been maintained and what has been added) reveal the levels of change (or categories of change).

Call for action:
Compare the before and after;
Analyze according to the intention, need or objective;
This change is evaluated according to the indicator.

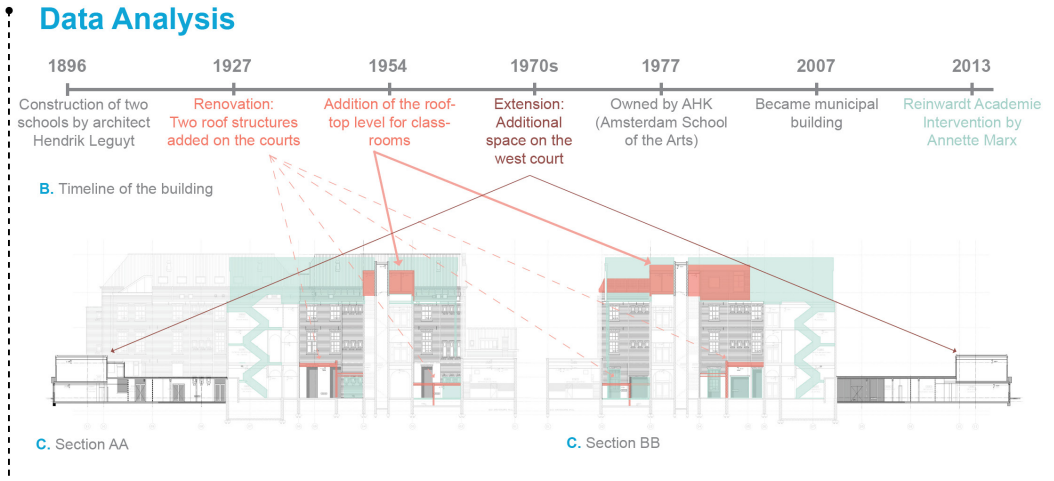
It is also relevant to say, taking back that the collection process needs us to keep our eyes wide open and the analytical brain always ready, the building elements can give us information of the most varied type, so it is important that the analysis of the information be objective and rigorous in understanding what happened, the various meanings that a change may have, but, simultaneously, keeping aside any judgment, or tendency to an immediate pre-assessment that results from the visualization of + and - associated with this change. At the same time, extreme care must be taken with the value we attach to + and -. An addition to something is not always a positive sign. Only if this addition comes against a need imposed by the program or the state of conservation of the element or space, is a positive sign. But if there is no balance between need / justification and action, then we can understand a change, even if it is +, as a minus at the end.

Surprisingly, the last step (oral history) led to the re-interpretation of step 4, the layers of time, which have shown that while applying necessary changes (removing parts/adding new parts) to the window frames, the architects kept one objective in mind: to keep/regain the original atmosphere of the building as much as possible, while using the knowledge of technicians specialized in wooden window frames, and also, while adapting the original design to a more efficient one, that could guarantee a better environment in the building.

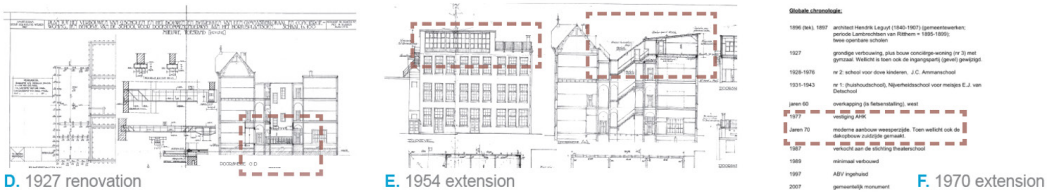
Case Study 1: Reinwardt Academie, Amsterdam (Max Henneman, Marina Brucker, Diana Ugnat, Lars Bouter, Pien Tol, 2020)

As stated previously, in Diana Ugnat's approach, the focus of the impact analysis were the rooftops, courts and openings. As suggested, her analysis included building the chronological mapping of the building, the archival collection and data classification

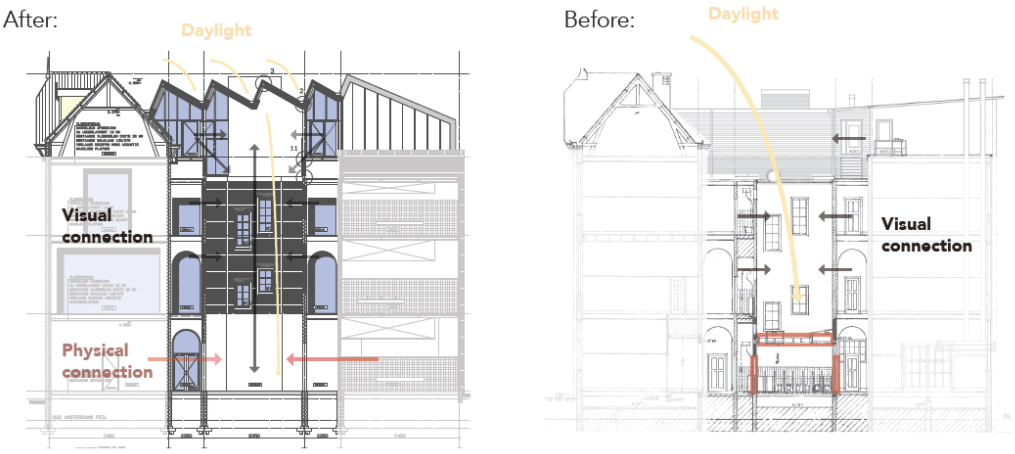
& analysis, the redesign of the necessary drawings ('redesigning for analysing'), the data analysis according to the Turner's framework, and, finally, the assessment (which will be explained in the next segment).



Step 1: Chronological mapping of the building. (This step helped understanding to what extent the layers of time are visible and traceable. In simple terms, the visualization of the layers of time, can become tricky, especially if we use a considerable variety of terms and elements, and also, if we are looking at elements which relevance and impact can be considered somewhat abstract. In this case, there's a clear visual code, for what's happened in the building throughout the years and how those changes make it relevant to chose these 3 elements for her study).



Step 2: Archival collection and focus definition. (This step helped redefine the focus of the work making use of the material available, particularly for better understanding the relevance of the three chosen elements, once their relevance was settled. It is crucial that students notice how different sources of information can be interlinked to create a unified reading of a single element, but it is also important to point out that this is a crucial moment to confirm if all the information/documents needed are available, or, at least, if a satisfiable amount of data is available.)



B. Section central court. Design Annette Marx

B. Section central court. Intervention 1927

Step 3: Redesigning for analysing (The objective of redesigning is to create a new, personal visualization that allows to combine all data collected before. While applying a unified visualization of the relevant information, Diana put aside unnecessary elements and was able to create a new narrative using the original material as the basis for her analysis and rationale. It also can be helpful for mapping or numbering the elements that you'll be focusing on for determining the impact of change, etc).

Kept
Removed
Added

B. ABCD Matrix

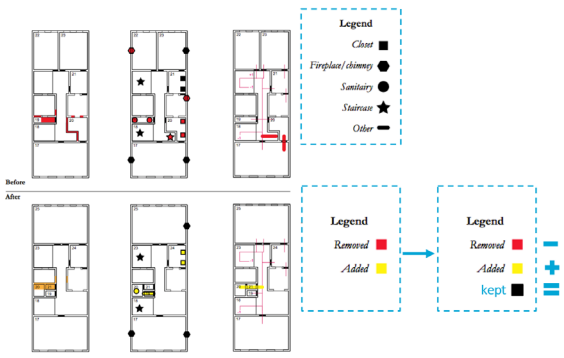
	Site	Facade	Entrance	Aesthetics	Courts	Rooftop	Materiality	Usage
Before				same style	closed	yes	same texture	school
After	same	same	same	modern roof	opened	yes	brick / steel / glass	academy

Step 4: Data analysis (rooftops; courts; openings).

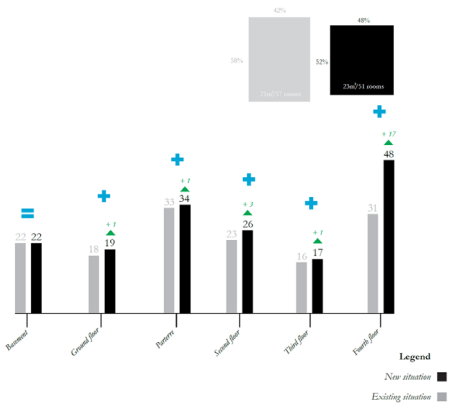
Case Study 2: Herengracht 448, Amsterdam (by van den Berg, 2013)

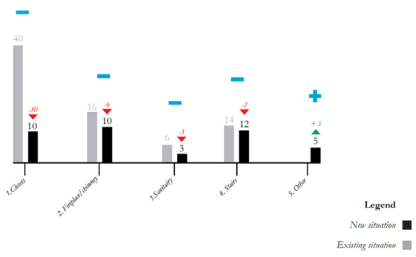
Indicator: space / areas

Indicator: space / number of spaces



Indicator: space / elements





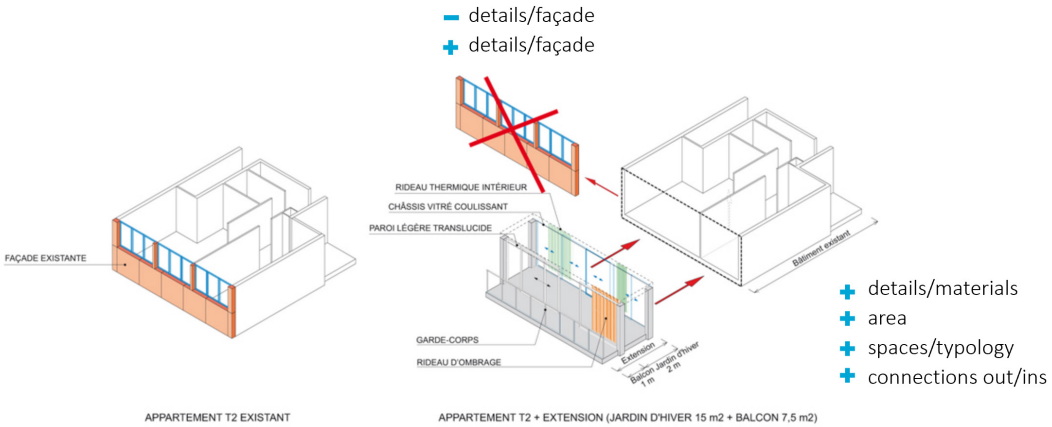
Indicator: space / areas

Indicator: space / number of spaces

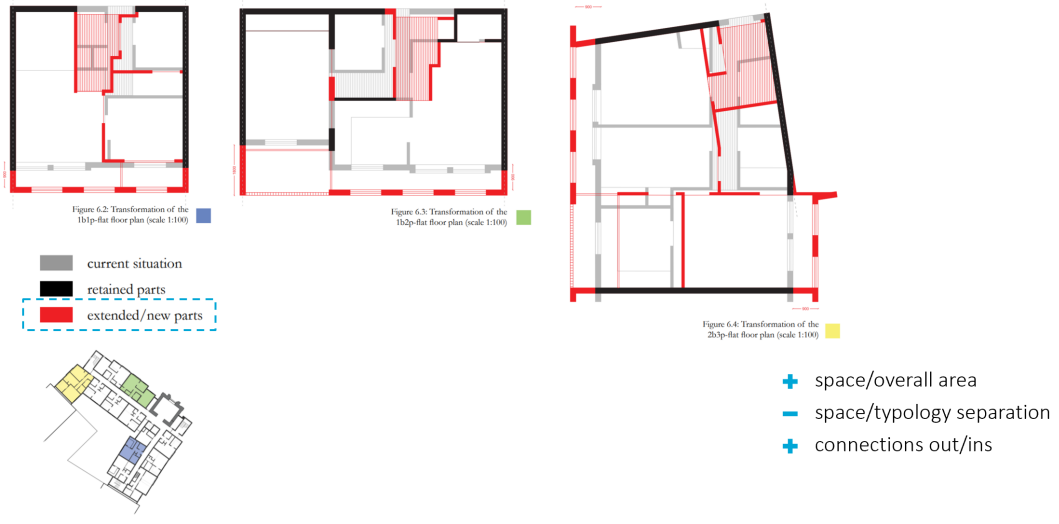
Indicator: details / elements

Indicator: space / elements

Case Study 3: Transformation de la Tour Bois le Prêtre, Paris (architects Lacaton & Vassal, 2005-2011)



Case Study 4: Trust Housing Stockbridge (sheltered housing complex), Edinburgh #1 (van Niel, 2013)

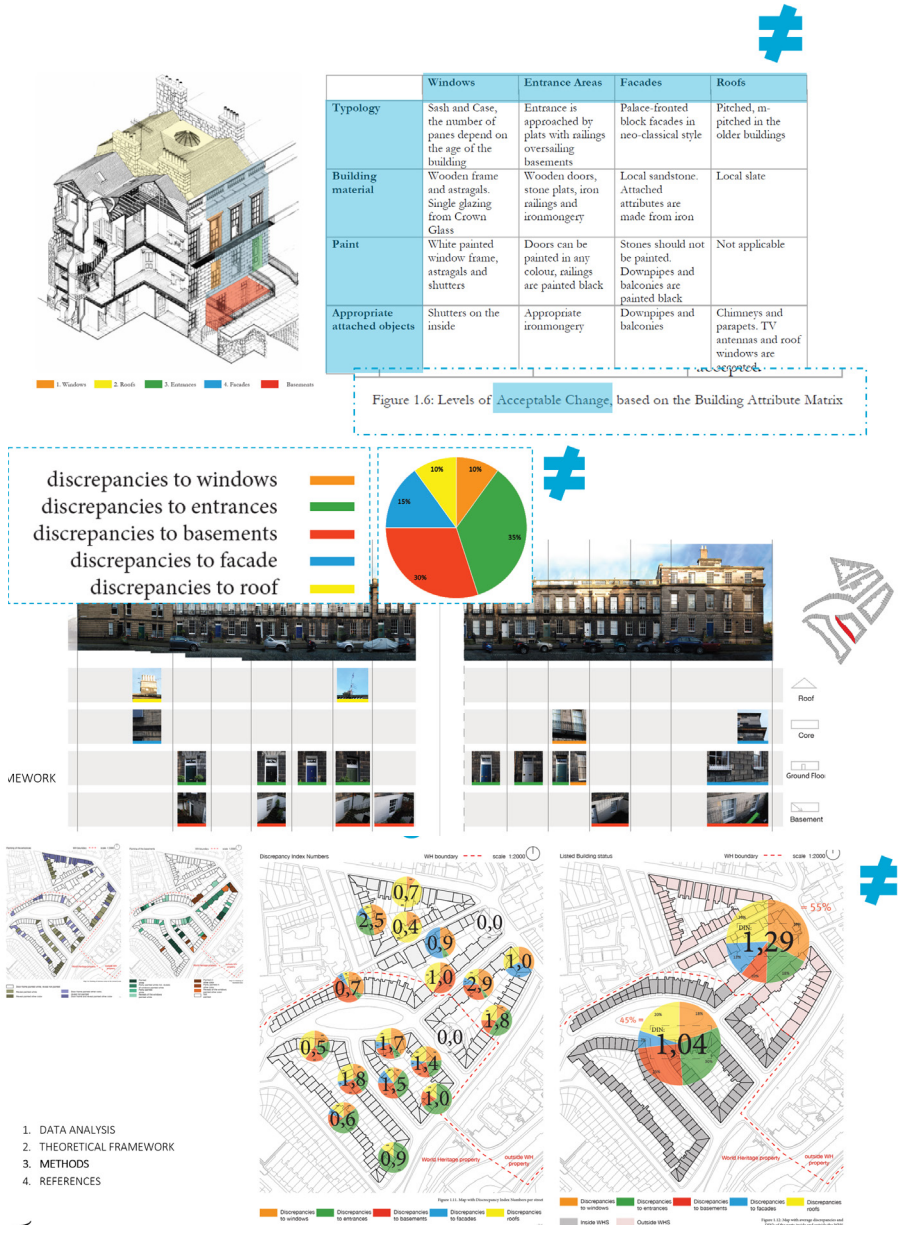


Indicator: space / areas

		THS (sq.m.)	LHDG (sq.m.)	Proposal (sq.m.)	
1b1p					
	Gross Internal area	**32,3**	**37,5**	**39,1**	
1	circulation / hall	2,88	1,5	3,7	+
2	living + dining	10,73	15,2	16,9	+
3	kitchen	6,13	6,2	-	+
4	bedroom	4,62	8	8,8	-
5	bathroom	3,4	3,6	4,5	+
6	storage/utility	3,4	1	0	-
7	outdoor amenity space	0	4	2,6	+
2b2p					
	Gross Internal area	**46,6**	**50,3**	**54,3**	
1	circulation / hall	4,5	6,5	4,1	-
2	living + dining	14,25	16,6	27,6	+
3	kitchen	6,13	6,8	-	+
4	bedroom	13,5	12	14,4	+
5	bathroom	3,4	4,4	6,3	+
6	storage/utility	2,88	1,5	1,8	-
7	outdoor amenity space	0	5	4,5	+
2b3p					
	Gross Internal area	**59,3**	**61**	**65,7**	
1	circulation / hall	6,8	6,5	6,3	-
2	living + dining	14,35	17,6	26,3	+
3	kitchen	7,13	7,5	-	+
4	bedroom 1	11,72	12	7,5	-
4	bedroom 2	8,39	8	15,3	+
5	bathroom	3,48	4,4	7	+
6	storage/utility	5,2	2	1	-
7	outdoor amenity space	0	6	5	+

Indicator: space / areas

Case Study 5: Edinburgh # 2 (Bennink & van Niel, 2013)



Spotting changes does not automatically mean to associate a change with a positive or a negative impact. It means essentially that we're annotating what has changed, either it means that something has decreased, or something has been added. This implies a certain level of acceptable change, which will be extremely relevant when assessing the impact of change.

In this case study, so far we can only tell that discrepancies have occurred in a variety of attributes. If these discrepancies should be considered positive or negative, is something to be supported by a set of criteria that defines the intervals of 'acceptable change' and associates this change with an impact degree/classification.

Assess

Impact Assessment

- When and how do my analysis + and – turn into positive and negative impact assessment indicators?

- What should I consider to be "right" or "wrong" when assessing architecture interventions?

- Should I believe that the criteria that generated positive or negative results in other domains will have the same impact when it comes to architecture and the space itself?

It is hard to make assessment specific and objective when it comes to architecture. If the elements of analysis allow us to do quantitative analysis, our task gets easier, because we can turn all the information into numbers and ratios (i.e., studying areas, number of doors types, number of windows, number of spaces, materials added and subtracted, etc.)

Still, in architecture there's a lot of personal interpretation, in particular when it comes to indicators that have the potential to be more subjective, i.e. aesthetical analysis, body-building "perception" while using the building, etc.

In all the examples of analyses/methods/books/etc there is not an assessment in the sense of a good/bad evaluation *per se* without any relation to other indicators and/or domains.

"**Sensitivity to change**"

(van den Berg, 2013)

The Twin Towers in New York after they have been destroyed became more important in peoples mind than before (https://www.anderetijden.nl)

Architectural Assessment is a lot about results of analysis. Those are needed to explain why the impact of the intervention is judged more or less positive or negative (by the person doing the judgement).

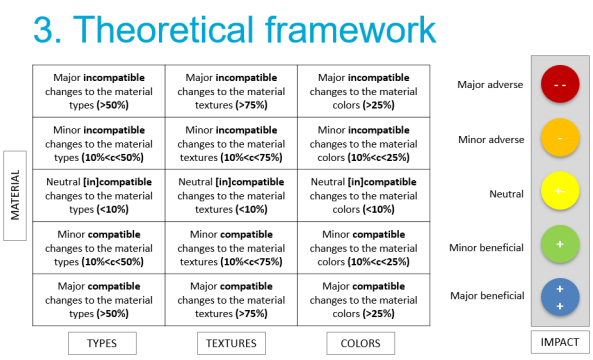
As we told you in the previous lecture, it is a lot about noticing and analysing the change itself, that was implemented in the buildings AR-DNA, so a very pragmatical analysis of what has become different between the before/after situation, but it is also, a lot, about the "Whys" and the motives that lead to that specific change. That's

why "sensitivity to chance" is so important when you're evaluating it, in its relation to the meaning of that change in a specific element/building. For instance, are the Twin towers in New York after 9/11 got more important than before 9/11 even they do not exist anymore?

Also, it is a lot about being conscious that applying very objective and pragmatical parameters/criteria to architecture analysis doesn't always mean that the tool and its criteria is going to lead you to the correct evaluation, at the end, and that by having the same kind of results in assessing different projects by just simply applying the same methodology, tools and criteria provides you with solid and automatically assessments.

Theoretical Framework

You define the theoretical framework concerning each of your indicators, based on literature or assumption. There is no wrong scale, but you do need to explain it. There is no given definition of "high compatibility" or "low compatibility". It is up to you to define the terms of compatibility and also the scale of acceptability of change, because they can (probably) differ depending on the part/aspect of the building you are looking at.



It is needless to say that it is necessary to state the importance of each aspect (related to the other aspects) to be able to come to an overall conclusion. Also the definition of every Judgement (— to ++) needs to be stated to be able to compare to other interventions.

Methods

You might notice that the tendency of most of the studies is to define the intervention only by the amount or percentage of change itself, and classifying the impact as neutral to very large, while by very large they mean very bad because the building has been severely changed, and by neutral they mean that nothing has changed.

At the same time, in a very general way, you might notice change (by just doing a comparison between the before and after) is automatically interpreted as something "damaging" for the building, even when the change means that you are "adding" to the building something that has been important for defining the buildings AR-DNA in the past and has, somewhere in time, disappeared.

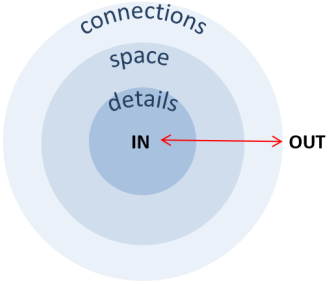
Mixed theoretical framework: Pereira Roders, 2020 / van den Berg, 2013.

Still, we've come across a variety of examples that have shown us that despite the impact of change in the original state of the building might be alarming (if we look only to numbers/indexes), there are other factors that help us determine if that amount of change is actually bad *per se* or if, while it's connected to other factors, that can determined by the project's necessities or the user-experience feedback, and be turned into a "good" change. That "severe" amount of change can represent something positive in the end.

At this point, it would be very important that although some of the examples that we can provide you have the type of evaluation that you see on the legend related to the Mastermind evaluation colour scheme, it is important that you rethink these percentages and how they relate to the type of change you consider to be acceptable or not acceptable. By doing that you will also be able to develop and explain your own sense of impact, both positive or negative.

Again, here some weighting is necessary. It is about frequency and about importance: if this happens a lot and is very important, than the overall assessment is rather clear, but more combinations of frequency and importance are necessary.

Please discuss amongst each other the weighting of both frequency and importance and remember that it is not on the outcome only, but mainly on the reasoning behind the outcome.



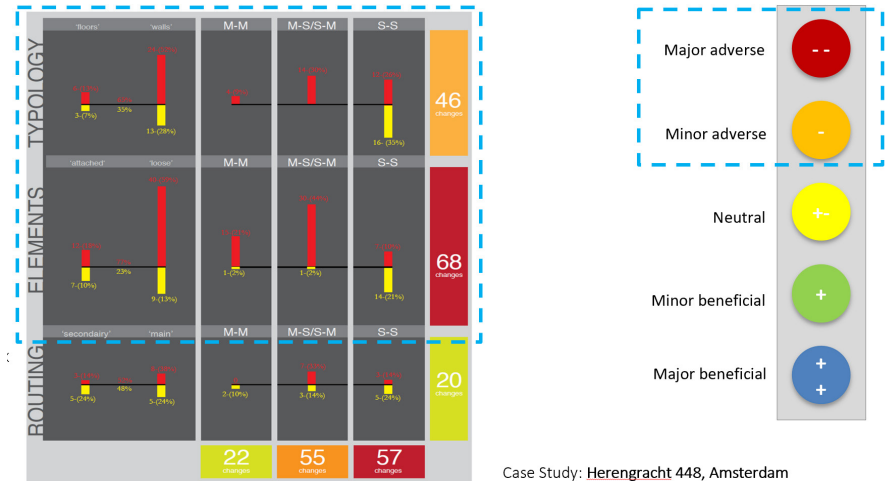
This is very important, in particular because the potentialities that you have identified in your case study (that ultimately lead you to choosing your set of indicators/sub-indicators) and the purpose of that choice might be crucial to better define the specific criteria that leads to your evaluation.

In the end Architecture needs to be assessed in one colour in the mastermind tool. Then it is about the improvements (yes/no) after the redesign interventions, even if it means that, by the end, you need to create your own, adapted, set of values/criteria for what's revealed to be beneficial or adverse in the architecture intervention.

Also, the idea behind these three dimensions of analysis, is that you look at a building not just as an object, but essentially as a living element that relates to the surrounding space, that has its own details proving its uniqueness and that all these three dimensions are influenced by the purpose for the use or the redesign of the building.

So, although you might be analysing each sub-indicator separately, you'll have to come up with a final and single code for the architecture domain, and that means that after analysing the pieces and discovering the overlaps your evaluation is supported by the holistic interpretation of all these elements/indicators and their combination.

Case Study #1: Amsterdam

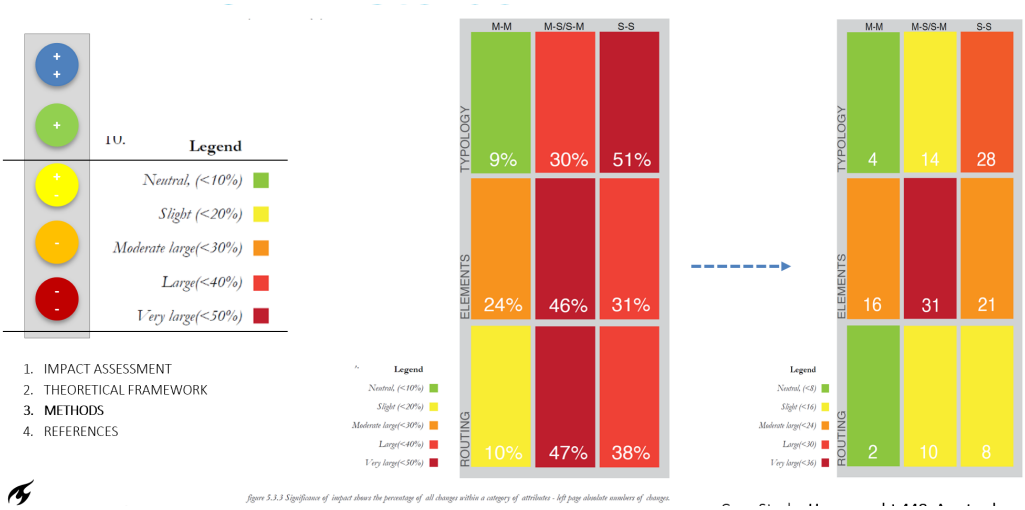


Case Study: Herengracht 448, Amsterdam

Indicator: Space/Areas

The final results have shown that, by comparing the before and after redesign situation, and converting that data into percentages(in typology and on the elements), the changes ration are considered to be, in general, adverse to what's related to the building AR-DNA.

Where does this evaluation come from? And does this mean that this change is, in general, adverse to the building? Probably, yes, AR-DNA has been changed. On the other hand, does this automatically mean that the overall change is negative? No. If you recall that the change in the number of elements was related to the change in the number of spaces and its use, you could conclude that the change on the elements was not so drastic for the overall assessment once all the three indicators would be combined into one final evaluation.



In this case, you could both interpret the results by looking at the percentage of change, or the actual number of changes. But what we want you to focus on is, once again, the criteria defined for the specific case. In this study, every change was interpreted as non-benefitial to the building DNA, so you can't find any positive scores, or, in other words, what you would consider to be positive was the non-existence of change. By saying this, you can conclude that the neutral score is a positive consideration.

Still, this is related to the objective of the assessment and what was defined as acceptable, non-acceptable and positive for the building.

In this case, the focus was the change in the DNA of the building, independently of what's the reason/or motive that lead to the change itself.

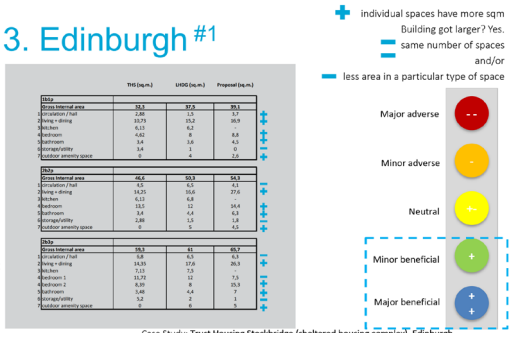
This is not an existing method of assessing impact. Please explore the chosen parameters together with the aspects to be determined in the end. There is no right or wrong definition of a parameter/aspect and there is also no right/wrong definition of the weight per aspect and the weight per element/component/part. You are asked to discuss this amongst each other and find out if you can come to a common ground. If not, not a problem, but explain why.

Examples of applicability:

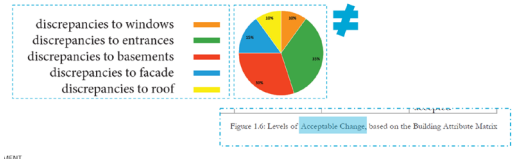
Edinburgh #1 case:

We could look only for the numbers and notice that by decreasing the area in some parts to increase other parts of the building some space typologies were affected negatively by change.

More importantly, we could notice the overall area of the building as also increased, to make room for all these changes concerning the internal areas, so we could add to the analysis/assessment how the visual connections inside-outside got better and also the response of the project to its objective: to create better conditions (areas for mobility, better physical communication interior-interior and better visual communication interior-exterior) for elderly people to live in this building.



So the overall score, after the final combination could be both minor beneficial or major beneficial, depending on the importance of each of these indicators.



For the second Edinburgh case, you must remember that although the study was about "discrepancies", meaning what's been changed in the buildings' façades, there was a margin of acceptancy for those changes.

Also, in some cases, what we call change is something as simples as doing some conservation and returning the building or an element to its original state by adding some more protective layers and repainting it. In a situation like this, it is still change,

but by taking a holistic approach to assessing this change we would consider it to be beneficial, IF, the parameters for acceptable change took into account that kind of intervention as something positive or "acceptable".

Case Study: Edinburgh
(Bennink & van Niel, 2013)

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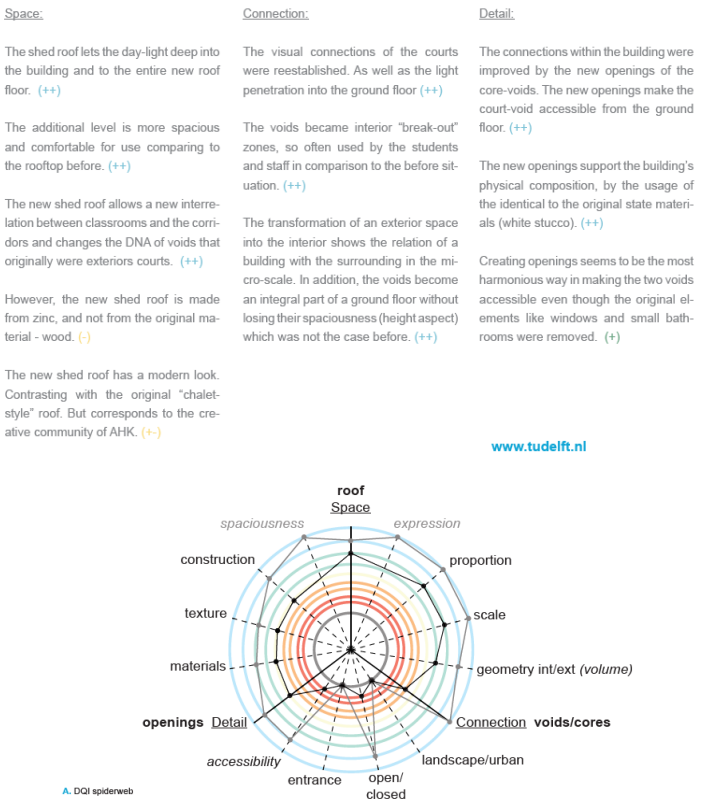
So in this situation, we can't only pay attention to the objective of the analysis and assessment, we would also have to take into account which parameters were guiding/orienting these decision on what's neutral, beneficial for the overall situation or adverse.

Once we only know that discrepancies were noticed, quantified and studied, we could conclude, on one hand, that only acceptable changes were annotated (which we don't know). If we consider to analyse the information in such a way, we could consider the impact to be minor adverse, neutral or minor beneficial, depending on how profound this changes were.

On the other hand, if both acceptable and non-acceptable changes were studied and quantified, we could conclude these changes to be less beneficial or major adverse because the non-acceptable changes would have a more serious impact.

Case Study: Reinwardt Academie, Amsterdam (Max Henneman, Marina Brucker, Diana Ugnat, Lars Bouter, Pien Tol, 2020)



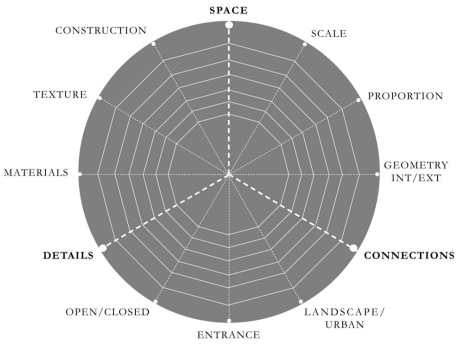
Step 5: Assessing the redesign per category; weighting the parameters.

Step 6: Building the assessment spiderweb.
In Diana's case, it was important to accept not only that changes affect the significance of the 'old self' of the building or spaces, but also, that accordingly to the need or intention for the redesign project, change can also imply a positive contribution for the 'new-self'. Although making good use of the policies available on Heritage Impact Assessment a balance between change/immediate impact and recommended change/needed was a turning factor in the success of her approach. This means, that you must make use of the documents available that guide you through assessing impact, but you must, also, feel comfortable to create your own set of criteria once you are certain that a change (big or small) had a positive impact on the redesign building.

Note that there is a difference between change and impact. The change can be major, but the impact can still be beneficial (if e.g. a lost value in re-introduced). Also the change can be minor, butt the impact drastically adverse (if it is a small but highly important detail that changed). So: distinct in your own project clearly the change from the impact.

As you might recall, in the first chapter we presented the DQI and kano methods. The main indicators were connection/space/detail, but we suggested that you could add more indicators, or make those more specific with sub-indicators.

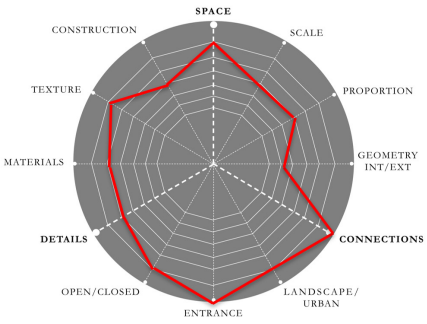
At this point we suggest that you draw the DQI/Zijlstra spiderweb by you with your indicators and sub-indicators.

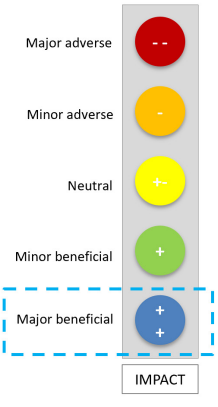


Zijlstra/DQI spiderweb (Zijlstra, 2020)

In the traditional DQI assessment web you can judge on a scale from 1-6 the improvements between before and after. Still, this assessment tool is only allowing us to evaluate a building in a positive way, when we are aware that some of the change may prove to have a negative impact on the overall situation of the building. Saying this, we consider that scoring a negative change with "1" is still classifying it as something positive and, also, it still is not so easily relatable with the mastermind code.

So for the Mastermind, specifically, we suggest that if there are no improvements (pos or neg) then you keep the line in the middle. And also that you change the score scale, which could be, as an example, "-4/-3/-2 /-1 /0 /+1/+2/+3/+4".





Taking by example one building where there's been a significant improvement on connecting inside and outside, by the entrance (+4), we can simulate one possible assessment.

a) scale and proportion it has not been changed (i.e., 0).

b) the use of materials has been changed in a positive way (i.e., +2/+3).

So finally for the impact code in the mastermind overview it could be overall a BLUE peg: Major beneficial in Architecture, because on two (i.e., Connection/Detail) of the three main indicators, the building has been improved. Of course this is subjective / personal, but the analyses can show how on the sub-indicators the improvements can be motivated.

What we could suggest, was that you tried not only to come up with your own score scale and criteria combination, but also that you tried to create something that could be used by all the students in the architecture domain, exploring the importance and significance of change in each case and letting that define the scale for evaluation.

Conclusion (and next steps)

The main objective of the Mastermind Architecture domain is to contribute for the students' awareness of the impact that changes have on various aspects that play a role in architecture redesign. We are looking for opportunities to build up knowledge to improve the course and the collection of best practices in Re-designed buildings with heritage value, while learning from them. An important aspect of this approach is the need to develop the understanding of buildings based on space rather than on functions and understanding the value of reprograming buildings considering space as a non-changeable characteristic, therefore, with a high impact on any redesign solution.

Being aware of the variety of frames of references available to compare, evaluate and appreciate the buildings, the possibility to combine different aspects of each methodology becomes an attractive argument for the pursuit of architectural analysis and assessment. By looking at it in such a way, we believe that we can contribute, together with the students, to define new criteria and to enriching the existing impact assessment criteria and methodologies, by making them more specifically applicable to the architecture aspects alone and by combining the present premises on heritage with the premises that we've learnt from our masters, therefore, continuously connecting past and future.

For future steps, we expect to contribute to the enrichment of the discussions on the impact of change when applied exclusively in the domain of architecture which assessment, when momentarily separated from the other domains, seems too abstract and subjective, even if we look at architecture as a profoundly holistic field. By reducing information through redrawing and combine the main features to compare them the impact of change on space, connections and details can be researched and assessed.

References

Balen, K., 2008. *The Nara Grid: An Evaluation Scheme Based on the Nara Document on Authenticity*. APT BULLETIN: JOURNAL OF PRESERVATION TECHNOLOGY.

Bennink R.; van Niel W., 2013. *The Old and New Towns of Edinburgh. A research into the built heritage management in the border area of the World Heritage property*. Eindhoven. Eindhoven University of Technology.

Berg. D., 2013. *Amsterdam as a case study; II: Retrospective heritage impact assessment*. Eindhoven. Eindhoven University of Technology.

Bloszies, C., 2012. *Old Buildings, New Designs*. New York: Princeton Architectural Press.

Brand, S., 1994. *How Buildings Learn. What happens after they're built*. New York: Viking.
(documentary on youtube: https://www.youtube.com/watch?v=AvEqfg2slH0)

Clarke, N., 2018. *Decoding AR-DNA: Understanding Adaptive Housing Opportunities Latent in Structural Systems of Existing Buildings*. In Cairns, G., Chatzichristou, C., Day, K (Editors). *Housing Solutions through Design*. Faringdon: Libri Publishing.

Foqué, R., 2010. *Building Knowledge in Architecture*. Brussels: Asp/Vubpress/Upa.

Foscari, G., 2014. *Elements of Venice*. Zürich: Lars Müller Publishers.

Hendriks, L., 2009. *The interpretetion of cultural historical heritage.* The Hague: Rijksgebouwendienst.

Jenkins, E., 2013. *Drawn to Design: Analyzing Architecture through Freehand Drawing*.

Koolhaas, R. (OMA), 2014. *Elements*. 15 Books. Venice: architecture biennale.

Kuipers, M.; Jonge, W., 2017. *Designing from Heritage: Strategies for conservation and conversion*. Delft: Delft University of Technology, the Netherlands.

Perez-Gomes, A., 1990. *Architecture and the Crisis of Modern Science*. Cambridge: MIT Press.

van Niel W., 2013. *Redevelopment of the Trust Housing Stockbridge a barrier free design proposal for a sheltered housing complex for elderly people in Edinburgh*. Eindhoven: Eindhoven University of Technology.

Versluijs, V., Jansen, I., Zijlstra, H., ea, (will be published in 2021). *Spatial Building Typology of V&D departement Stores in The Netherlands*. Delft, University of Technology Heritage & Architecture.

Volker, L., 2010. *Deciding about Design Quality: Value judgements and decision making in the selection of architects by public clients under European tendering regulations*. PhD Thesis, Delft University of Technology, the Netherlands.

Unwin, S., 2009. *Analysing Architecture*. New York: Routledge.

Zijlstra, H., 2009. *Analysing Buildings from Context to Detail in time: ABCD (in time) research method*. Amsterdam: IOS Press.

Guidance on Heritage Impact Assessments for Cultural World Heritage properties, ICOMOS 2010.

Design Quality Indicator:
http://www.dqi.org.uk/howdoesdqiwork.php
http://www.dqi.org.uk/
http://www.dqi.org.uk/dqi/Common/DQIOnline.pdf
http://www.dqi.org.uk/perch/resources/dqi-schools-guidance-copy.pdf

Kano Model:
https://www.kanomodel.com

Emeline Lin's design project, Milandia:
https://www.facebook.com/HollandMilandia.