Sustainable monument care
a theoretical framework to design for the future

Vera Franken
Sustainable monument care

a theoretical framework to design for the future
Vera Franken

Sustainable monument care.
A theoretical framework to design for the future

First edition

Voor papa.

© 2011, Vera Franken
ISBN 978 1 4467 9491 3
verafranken@gmail.com

ALL RIGHTS RESERVED. This book contains material protected under International and Federal Copyright Laws and Treaties. Any unauthorized reprint or use of this material is prohibited. No part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system without express written permission from the author / publisher.
PREFACE

As long as I can remember I wanted to be an architect. Because I liked to draw, but even more because I liked to wonder through houses, fantasizing about what these spaces could be like. Our home was permanently ‘under construction’, never finished and full of promise. My grandparents lived just around the corner and their home was an even greater source of unfulfilled potential.
After entering the house through the backdoor, I’d first say hello to my grandmother in the kitchen and ask for a piece of liquorice, than rush to the living room to give my grandfather three kisses, and than an additional one, to keep him from walking skewed.

At the back of the house there was the old café Laros, which was only in use as a storage room and the occasional family christmas dinner. It was a dark room, because a high hedge kept the light from coming through the windows, and the windows hadn’t been washed for ages. From the hall I would enter the room through a door with a colorful mosaic of stained glass. It was a place where my grandmother would store her pottery things. There was an oven and shelves full of vases and bowls she had made herself. She had used the old bar of the café to store them. Behind the bar were the shelves with a mirror behind them. Next to that, on the bar, a display case for cakes. Now it displayed a single pottery dish with a crack down the middle. There was a case of apples from the garden that were put there to stay cool and dry.

Behind the bar there was a door that lead to the porch in front of the house. I could see it was nicely cut, but it hadn’t been looked after for a long time. The roof was perforated where the windows were to permit more light, but the plastic cupolas where covered in green moss. Looking through the thick pack of leaves I could see fragments of the nice view of the street and bridge crossing the creek in front of the house.

In the middle of the room there was a large table with all kinds of tools. Boxes with parts of electrical appliances and boxes with old pots and pans, all kinds of things waiting to be used by someone, some day. If I looked a bit better I could see that the large table was actually all small café tables with their beautifully decorated chairs shoved beneath them.

The walls were a dark and mysterious green with a dark green wainscot and stained from the moisture coming from the wall. Just below the ceilings there was a lining of jugendstil-like decorations, painted in black. On the wall opposite the windows there was a painting of a young woman with red hair, a strong nose and pretty lips. The woman was wearing a white dress with a blue collar and a red pearl necklace. The woman was my grandmother when she was younger.

When I wondered further to the back of the café I’d approach the green panelled sliding doors. When I looked up I’d see my reflection in the mirror on the back wall. The mirror was beautifully framed, almost as if it where a roman temple. To the left there was a table where my grandfather had stored all his nails and screws in little glass jars. In winter the long tables and the benches that were put in front would be crammed with plants that had to be kept inside to protect them from the frost.
Behind the table there was a window that didn’t look out, but into another room. The middle room had a wood fired stove where we would put our shoes in front once a year around the fifth of December.

Next to the big mirror there was a door leading to the former toilets. The door with a small enamelled sign saying ‘urinoir’ above lead to my grandmothers herb and flower garden on the patio. After wondering in the dim café I’d have to blink my eyes for the bright light flooding the patio.

I have always loved wondering trough that house. It was old and ramshackle, but was also full of character and unexpected quality. My favorite thing was to imagine what all these spaces could be like, if they would all be made to fulfill their great potential.

As I grew up it became more and more clear to me that what I wanted to be was called a restoration or renovation architect, and after finishing highschool I started studying Architecture in Delft. During my studies I became more and more aware of the professional responsibility that architects have, to think about the environmental impact of the built environment they are designing in. To be aware of the problems the world is coping with en the vast changes that we are facing.

Although ‘sustainable building’ is a discipline that is largely focused on new construction, I have always felt that design for sustainability should also be part of the restoration and renovation architects’ profession. It is my strong belief that design for sustainability in the context of our built heritage should be the basis of an integral approach to the design task, to be able to really contribute to the sustainable preservation of architectural heritage and housing stock.

The research that you have before you is the result of one year of research and design attempting to found this belief.
1 Research proposal
1.1 Fascination
1.2 Project goal
1.3 Research outline
1.4 Literature study
1.5 Design

2 The dilemma’s of monument care
2.1 Why do we preserve?
2.2 What do we preserve?
2.3 How do we preserve?
2.4 The dilemma’s of monument care

3 Sustainability is the answer, but what was the question again?
3.1 ‘Houston, we’ve got a problem’
3.2 Outlining the solution
3.3 Elaborating the concept of sustainable development
3.4 Quantifying sustainable development
3.5 Innovations
3.6 Conclusion and reflection
4 Design for sustainability ..........................................................51
  4.1 Reducing the environmental pressure of the building stock........52
  4.2 Environmental effects..........................................................54
  4.3 People, planet and prosperity...............................................56
  4.4 Design strategies for sustainable building..............................56
  4.5 Guide to sustainable monument care....................................59

5 Making sure history continues by continuing to make history.......63
  5.1 The importance of built heritage for human development........64
  5.2 Historical continuity..........................................................65
  5.3 The Trias Cultura: guidance for sustainable monument care......69

6 Design reflection........................................................................73
  6.1 From research to design......................................................74
  6.2 Grasping immaterial values..................................................79
  6.3 Reflection............................................................................89
  6.4 Design concept.................................................................90
  6.5 Reflection on design..........................................................91

Literature.....................................................................................97
1. Research Proposal

2. The Dilemma's of Monument Care

3. Sustainability is the Answer, but What Was the Question Again?

4. Design for Sustainability

5. The Importance of Heritage for Human Development

6.1 From Research to Design

6.2 Design Concept

6.3 Reflection on Research and Design

Supposed solution: the "Handbook voor monumentenbehoedzaam" will do.

First, I needed to bridge the gap between research and design.

Here I realized the existing solution wasn't the answer and was inspired to a new solution.

Here I'm gaining insight into the problem.

And this brought me back to my fascination.
It all started with my fascination, that came down to the strong, but unfounded belief that design for sustainability is, or rather: should be, about more than just ‘after-insulation’. It should be the basis of an integral approach to the design task, to be able to really contribute to the sustainable preservation of architectural heritage and housing stock.

Looking back on the research proposal (chapter 1) on which I based my research, it is clearly aiming at a presumed solution direction. Even the formulation of my research and design goals as a first translations of my fascination were, in hindsight, based on my assumption about what the answer to my problem would be. I thought it would be some kind of practical, creative and architectonic solutions for the integration of sustainable building technology in monuments.

During my research I gained a deeper insight in the problems of monument care (chapter 2) and sustainability (chapter 3 and 4) that I was trying to solve, and with that I became aware of the fact that my supposed solution wouldn’t be the answer to my problem. The deeper insight in the matter also inspired me to think of a new solution (chapter 5). Meanwhile I was struck by the inspiring power of first trying to grasp the essence of a complex problem, and only after that looking at predefined solution sets. In my case this predefined solutionset was the Guide for Sustainable Monument Care (“Handboek duurzame monumentenzorg”). After formulating my own solution to the problem, I needed to get started on my design. The gap between research and design can be bridged by analysis (chapter 6.1).

For this I have developed two analysis tools to fit the solution. The information I have gathered by analysis was brought together in the design concept for my sustainable design for the Café Laros (chapter 6.2). To conclude this research I have reflected on my design and research (chapter 6.3).
1. RESEARCH PROPOSAL

As an introduction to this paper, I will elaborate the research proposal that was the basis for my research. This starts with my fascination, the inspiration for the research. After that I will describe the research outline that has structured my research. Lastly I will describe the relation between my research proposal and the conclusions that are presented in this study.
1.1 | FASCINATION

“North West Europe is known for its many beautiful and characteristic cities. The rich architectural heritage attracts creative and innovative businesses that fuel a bustling city economy and a flourishing social life. However, these buildings must be adapted to modern standards of comfort and sustainability. Sustainably renovated buildings contribute to a CO2 neutrality by saving energy; use natural energy sources; have sustainable building materials; respect the cultural and architectural values and comply with the demands generated by climate change. This requires innovation of the construction and installation sector; creating opportunities for small scale, labour intensive craftsmanship. Unfortunately building at city fringes is cheaper and faster. So, if we wish to keep intact the architectural heritage with all its advantages for our urban centers, action must be taken!”

This statement is made about the goals of the LivingGreen.eu project, funded by the European Regional Development Fund. It stresses the need to explore the possibilities of transforming our heritage buildings in order to make them more sustainable, and by that prolonging their life expectancy, while also contributing to CO₂ neutrality.

Furthermore, design for sustainability is, or rather: should be, about more than just ‘after-insulation’. It should be the basis of an integral approach to the design task, to be able to really contribute to the sustainable preservation of architectural heritage and housing stock. This means I will be focusing my research and design on the possibilities that design for sustainability can create for designing with heritage buildings. How can the sustainable design concept ensue from the cultural historic meaning of the monument?

The choice to focus on heritage buildings is based on my own consciousness of the value of monuments for society. One monument in specific represents great value for me, and in my opinion also for society. This is the home of my grandparents, the former café Laros annex dwelling in the village Velp in the Dutch province of Gelderland. I have chosen this building to take up the challenge to design for truly sustainable monumentcare.
1.2 | PROJECT GOAL

My fascination has led to the following research goal: a design strategy that would result in sustainable designs for the renovation of monuments that ensue from the cultural historic meaning of the building. My design goal would furthermore be: Making a sustainable design concept for Café Laros, which ensues from the cultural historic value that are intrinsic to this building and by that enhances the immaterial qualities.

1.3 | RESEARCH OUTLINE

The central research question has been: Which design strategy would lead to a sustainable design for the renovation of Café Laros and other monuments from before 1940, taking into account the limiting conditions that are bound to these buildings, and enhancing the intrinsic values they possess?

The elaboration of this central research question has been based on the following sub-issues:

1. Monuments: restoration ethics and legislation
   What are the preconditions for designing for monuments that are imposed by legislation and by restoration ethics?

2. Monuments: intrinsic values of historic buildings
   What are the intrinsic, immaterial values of historic buildings, in comparison to newly built buildings?

3. Sustainable development: the basis
   What does design for sustainability mean in the context of the building industry?

4. Sustainable development: sustainable renovation
   What does design for sustainability mean in the context of renovation?

The research will be carried out in two phases. Phase one comprehends the literature study, and will conclude in my preliminary design strategy, based on the found knowledge. In phase two, the design for Café Laros using the design strategy, will be the last test phase for the design strategy. When the design process will come to an end, a reflection on the utility of the design strategy can be made, when looking at workability and the quality of the resulted design.
1.4 | LITERARY STUDY

I will be exploring the field of knowledge about sustainable renovation by means of five themes, respectively:

- the restoration ethics and legislation,
- the intrinsic values of historic buildings,
- the basics of design for sustainability,
- and sustainable renovation.

These themes are the guideline for my literature survey, but will, in some cases also include other types of research (e.g. interviews). The information that will be gathered in this phase, will be concluded into the preliminary design strategy. In the following paragraphs I will elaborate on the consecutive research theme’s and sub research questions, describing the research methodology that I will be using and the expected outcome of that part of the research.

1. Restoration ethics and legislation
   Sub research question: what are the preconditions for designing for monuments, that are imposed by legislation and by restoration ethics?

   - Restoration philosophies: which are the main movements with in the field, and what do they state?
   - What are design strategies based on these main restoration philosophy movements?

2. Intrinsic values of historic buildings
   Sub research question: what are the intrinsic, immaterial values of historic buildings, in comparison to newly built buildings?

   - Which immaterial qualities are being attributed to monuments by people who have written about monuments?
3. **Design for sustainability: the basics**

   Sub research question: what does design for sustainability mean in the context of the building and design industry?

   - What is sustainability, what is design for sustainability?
   - What does sustainable building mean. Which requirements need to be met in order to call a building sustainable?
   - What are existing design strategies for sustainable building?
   - What are existing checking instruments to value the degree of sustainability.

4. **Sustainable renovation**

   What does design for sustainability mean in the context of renovation?

   - Which sustainability demands differ from the ones stated for new housing, and to what extent?
   - What could be the impact of making the existing housing stock more sustainable (quantitatively)

**Conclusion phase 1: preliminary design strategy**

Based on the found information, what would be the right design strategy in my opinion, that would lead to the kind of restoration that I describe in my restoration doctrine?
1.5 | DESIGN

The need to keep our ‘rich architectural heritage’ safe, as stated in the problem description (p. 5), calls for a specific approach to monument care. Preserving heritage no longer means doing as little as possible. In order to make sure that the heritage will be kept for the next generations. This is especially important for the listed residential buildings, because they are usually owned by private homeowners.\(^2\) These owners carry the responsibility for the upkeep of their monument, and with that determine the future of the monument. Lack of maintenance and negligence pose the biggest threat for this group of listed buildings. By bringing these buildings up to modern standards of comfort and sustainability these buildings will again excite the interest of the private homeowners, and add to their willingness to invest in the maintenance of the building. The housing assignment for the coming years will need this historic component of monuments to supply a qualitative impulse to the living environment.\(^3\)

An example of this problematic nature is the former Café Laros building, situated in Velp (Gelderland). In the causal description\(^4\) of this listed monument, the building is prescribed as being a key part of the Jeruzalem neighbourhood, especially when the Café Laros was still in operation. Due to years of lack of maintenance the building has lost its important social function, and the condition of building itself has deteriorated extremely. In order to keep this monument, and to prevent the definitive loss of this monument, measures need to be taken. Otherwise the building will irrevocably decay.

The before mentioned causal description of Café Laros, includes a value assessment of the building. The characteristics are described according to the architecture historic value, the value on the scale of urban planning, and the cultural historic value. The following paragraphs are based on the causal description, as made by the RCE.

Architectural historic qualities

The building is significant because of the intact major shape, the notable detailing and use of materials; striking is the charming veranda at the front of the house. The building belongs to the oldest buildings of the former hamlet of Jeruzalem. Also of importance are several unique and rare interior parts. Particularly the Café interior with inventory, dating from around the turn of the century, with the gentlemen’s room in Neo renaissance tradition, and also the murals on the first floor are of particular importance.

---

\(^2\) Beukers and Boer (2009)  
In 2009 there are a total of 50,875 listed monuments in the Netherlands, of which by far the largest part (32,980) are residential buildings.

\(^3\) Ibid.

\(^4\) RCE (2006)
Urban planning context
The building has an image defining position, as seen from the bridge over the ‘Rozendaalse beek’.
The building adds important value to the ensemble value of the hamlet of Jeruzalem, which consists of villa and residential housing dating from 1825-1910. This part of Velp has kept its original character exceptionally well. This still unique area is being cut by the ‘Rozendaalse beek’, at which the paper mills used to be situated.

Significance for cultural history
The property has a high typological value of being a extremely rare and well kept example of a village café from the years around 1900. As a former meeting point for the residents of Velp, this building evokes of the village life in Velp and on Jeruzalem in this period of time.

1.5.2 | PROGRAM
Part of the new governmental policy concerning monuments, is to encourage well-considered forms of reallocation as a way to preserve monuments. In the case of Café Laros, I looked for a new function that would comply to the building and its context.

I would like to reinstate the public function of the building, because this social aspect has always been such an important part of the quality of the building. The new function for the building will be a knowledge centre for sustainable monument care, while maintaining the residential function. The knowledge centre will comprise of offices, and workshop space, a library and exposition space.
The fact that we have invented laws and regulations to protect our built heritage, indicates that we value our monuments enough to do so. But the care for monuments is a very difficult thing, because it is hard to pin-point exactly what it is we are protecting and why. Each time has had its own interpreters who have made changes to heritage buildings in order to keep them safe, one way or the other. In this chapter I will try to give a better insight in the moral dilemmas one is faced with when dealing with historic buildings.
2.1 | WHY DO WE PRESERVE?

The answer to the question why we preserve is inseparably linked to the notion of history that society has. The way we look at our past, and the part that our built heritage plays in this, can be categorized in four main attitudes: futurism, presentism, historicism and passeism. They represent four different views on the role history plays in present times, and with that the position and (social) function of heritage buildings.

The futuristic attitude represents the thought that history weighs the present and future down. A society that wants to be free and have all options open for its own evolution, should get rid of this burden of history. Heritage, recognized as being a part of history that is kept in the future, limits the possibilities for development of society. This is the position that is taken by the avant-garde, and by all iconoclasts, that want dismiss the burdens of the past for the future. This for example is also the basis for the modernist movement in the beginning of the 20th century, that wanted to move away from the traditional ideas about the arts.

Next to this negative valuation of history and heritage, stands the attitude of presentism, which denies the existence of heritage, or believes that there is no reason to conserve or pay any special attention to heritage. Presentism supposes that nothing else but the present exists, and that every human activity should be aimed to solve the problems occurring here and now. This attitude is at the base of every form of short-term thinking, because it does not only deny the past but it also denies a conscious orientation towards the future.

The thought that no society can completely detach itself from its history, which makes it necessary to have knowledge of this past, is the basis of historicism. This approach stresses continuity, and the importance of a conscious form of care for the heritage. This is the prevailing attitude, on which the concept of monument care is founded.

A step further is passeism, which leads to a nostalgic glorification of past times. The ideal world can’t be found in the future, but it lies in the past. Only the faults of present times compared to the past are remarked. This nostalgic attitude can sometimes be attributed to very conservative monument caregivers.

As an additional fifth attitude fatalism can be mentioned. It represents one of the main dilemmas within the discipline of monument care: the argument that all conservation is in vain. Fatalism proposes the core of the concept of heritage, the moral obligation to pass something through to the next generations, as unfeasible. Heritage, like all other material goods, are subject to the hands of time, and will inevitably perish. With this, fatalism denies the purpose of monument care, because efforts to preserve only result in delay and are therefore useless.
As mentioned above the concept of monument care is a consequence of the fundamental attitude of historicism that is deeply rooted in our society. Clear counter movements have certainly emerged, like for example the modernist movement that emerged at the beginning of the previous century, but society as a whole has never completely denied the existence, importance and value of history. Maybe the essence of what history means to us, as the Professor of Dutch history De Rooy from the Amsterdam University characterized, is that we can only understand this world, if we look at it as something that ‘has become’. Than we can see that there’s logic in the apparent chaotic and heterogeneous reality. The world possesses a continuity and can be understood from that. It is characteristic to human beings to want to try to explain why we are here on this earth, and why we are the way we are. These questions are human, and could for instance be seen as the reason for the existence of religion, to get an answer to these questions. We try to do the same thing by trying to unravel history, in hope of finding some answers. In that sense science could also be seen as a study of history.

But the problem with history is, that it is no longer. It has been and we can not travel back in time to witness what was in our past. We can only try to collect the pieces of evidence that give clues about history, so we can construct our
own image of the past. As Wessel Krul, Professor of Modern Art History from Groningen University, put it: “Elke tijd schept zijn eigen verleden. Dit kan echter alleen wanneer er genoeg materiaal voorhanden is om een keuze te maken.” Which implies that every age forms its own interpretation of what has been, using the evidence that is at hand.

This evidence is found in historic material in the form of books, pictures, rituals, but also for a very important part in the historic built environment. Buildings and structures are of great importance for the determination of history because they are, as it were, an unbiased witness. Whereas for instance books are already an interpretation of history by the writer. The information about the past that lies hidden in earth layers beneath the surface aren’t as easy accessible as is the built environment. In short this is the reason why preserve heritage, and why the government has taken up the care for our monuments.

Another important property of this attitude of historcism is that the belief in the importance of history for the present day society also supposes a belief in a concern for the future. This also is reflected in the concept of heritage, which means saving a part of history for the future. An approach that is based on continuity supposes the interdependency of past, present and future.
2.2 | WHAT DO WE PRESERVE?

Now that we know why we want to keep historic buildings, and being that keeping everything is both impossible and undesirable, the problem is to decide exactly what is worth keeping, and what is not. Our own image of the past that we all compute from the pieces of historical evidence that we come across in daily life, is very complex and constitutes partly of conscious knowledge, but also for a large part it is about an overall feeling of foundation. The part of contributing to our conscious knowledge are the interpretations of experts that study the historic built environment and publish history books about it. But exactly what material historic evidence provides society with an overall feeling of foundation in their daily life is much harder, maybe even impossible, to pin-point. It is hard to define because it is about immaterial things like feelings and thoughts that are evoked by material things, the historic buildings. These form the immaterial value of our monuments.

Some feelings and thoughts that are evoked by experiencing historical buildings have been commonly recognized as being valuable for society.

Most important is the fact that our built heritage can act as a (collective) memory. The historic building can be a memorial for a person or an event, or any other memory. The thought that monuments can be of importance as a memory of a historic fact or person, was already common in classical antiquity. In the beginning of the nineteenth century the French revolution caused a new awareness of this value of monuments, as a counter movement against the destructions caused by the revolutionaries. In the Netherlands this movement was also noticeable, illustrated by the story of the preservation of the Castle of Muiderslot. Muiderslot had been the home of Pieter Cornelisz Hooft, a famous Dutch literatur that had held gatherings with all his literary friends, the ‘Muiderkring’, in the castle. When the government in 1825 decided that Muiderslot had decayed too far, and would generate more money if sold to demolish, this generated strong protests. The opponents stressed the importance of the castle as a memorial for Dutch glory and history and one of the leaders of the protest pointed out that: “in alle gevallen de afkomsten van puinen van het voorsz. Slot nooit zullen kunnen vergoeden the pijnlijk gevoel, hetwelk vele Nederlanders zullen ondervinden, wanneer zij niet meer kunnen aanschouwen hetgeen hun eenmaal dierbaar werd en bleef.”

Willem Frijhoff, Professor of Modern History in Rotterdam, distinguishes three anchor points for the collective memory. The (collective) memory is a complex interaction between the historical and material component of the city and the social practices of its residents. The three anchor points are: the material objects and structures, social rituals and ‘testimony’, like literature and music.

Material components, buildings and urban structures only get meaning if they are connected with these social rituals and testimony. This also works the other way around, and this makes the material component of historical buildings and urban structures of great importance for the collective memory of a city.  

The memory can also be an architectonic memory, in which the development of building and architecture is stored. This was recognized when the history of architecture, presented as a chronological sequence of styles, was incorporated in the history of the visual arts in the mid of the twentieth century.  

One that has been beautifully captured in a painting by Rembrandt is that it can be a source of inspiration, because it lets us get in contact with our predecessors. The painting portrays Aristotle with the bust of Homer. The philosopher is trying to literally get in touch with his source of inspiration through his effigy in stone.  

Furthermore, built heritage can function as a mirror to reflect on the present time, because it gives perspective on the current way of living. Buildings are a very strong representative of the previous users through the imprint of the way they were used.  

Built heritage is a source of knowledge that can’t be found in written documents, for example, by doing spatial analysis a better understanding of the architecture can be achieved. Also building historic research leads to very specific knowledge about for example history, craftsmanship and building phases. This was very beautifully put by the French politician and historian F. Guizot in 1835: “L’histoire des arts, n’est pas point écrite dans les livres, elle est écrite dans les monuments.” Guizot made this comment in the context of the rise of Art History as a scientific discipline and the idea that monuments are a work of art that can provide insight in the history of a culture.  

In light of the above, built heritage can be an example for new architecture, this example can be either positive or negative. The historic building stock represents a database of examples of architectonic expressions and technical solutions.
2.3 | HOW DO WE PRESERVE?

Authenticity
When a building is decaying, there are two options. This first is to accept the decay and let it slowly go to waste or demolish it. The second option is to choose to preserve the building in one way or the other. In this stage the choice is between three possible ways of ‘preservation’. Copy, which would conserve the image of the building, or the other end would be: to conserve. This means keeping the material remains as they are at all times. The third option would be restoration. Restoration can be placed anywhere in between the two extremes of ‘copy’ and ‘conservation’. Exactly where it should be placed between these two depends on the degree and kind of authenticity that is pursued. There are five types of authenticity, namely: material, conceptual, functional, non-historic and historic authenticity. This means that the value that is assigned to a building lies hidden in one or more of these elements that are part of the building, and there for should be kept.

(Re)use or museum
The dilemma if and how to use vulnerable historic buildings is a very difficult one. A field of tension between using the monument or treating it as a museum piece is caused by the negative influence of use on the decay of the monument together with the fact that monuments derive their value from the possibility to use them.

The ability to transfer knowledge in an indirect way, requires that people are able to experience, use and enjoy the monument otherwise the building cannot pass on this knowledge. The fact that monumental buildings represent a part of history, makes for the main advantage as well as for the main downside. Because to be able to use the building in present times a certain level of adjustment to these modern times is necessary.

Auke van der Woud pleas to do as little as possible (preferably nothing) to adjust the monument to the present day requirements in order to keep the strong contrast between the past and the present, in his article ‘The ethics of abstinence. The practice of doing nothing in restorations’.

The influence of the architect
The way we see history and the future defines the way we transform our built heritage (monuments), but at the same time, our built heritage, and the way they have been transformed, defines the way we can see the past and the future.
This realization is crucial to determine the role of the architect. It gives great responsibility to the architect when working with monuments, because transforming monuments means to alter the ‘glasses’ through which next generations can view history. Value assessments touch the core of this dilemma. At one moment in time, previous value assessments, whether they are intended or unintended, determine the image of the past we can compose. This influences our own value assessment, which in turn influences the context for the defining of an image of the past in the future.

**Reversibility**

How do the interventions reflecting the current time relate to the interventions that represent former times? The two extremes of the answers to this question are: Yesterday was history. And tomorrow today has just been a waste of time. Or: yesterday was history. Make sure we can still say that tomorrow.
2.4 | THE DILEMMA’S OF MONUMENT CARE

The phenomenon of monument care is a very peculiar thing. We all agree that it is important to take care of our monuments, but there is no one sided answer to why it is important. The only thing that is certain is that protecting monuments is an attempt to save some part of history for the future. Exactly why, what and how this should be done is completely dependend on the personal interpretation of the monument care task by the caretaker.

This means that there is no fixed list of dilemma’s that need to be decided upon when dealing with monument care. Determining what the dilemma’s are relevant in a specific case is also an important part of the solution. Together with the own answers to the dilemma’s, they help to determine the own position pertaining to history and the future. What is the role of history in the future and through the intervention, what is the role of the interpretor in the future? The dilemma’s of monument care can be divided in three groups.

1. Why?
Why is the heritage building valuable, and to who is it valuable for that reason? Preserving heritage buildings is to keep some part of history because you think it is valuable for the future. It is of some kind of use to the next generations.

2. What?
What is it exactly that represents this value? The value us evoked by some part of the heritage, this can be material, but also something immaterial. Maybe it is in a specific spatial assembly of structure, finishings and the interaction with adjacent spaces and places. The value is in the meaning that one gives to the material, together with some kind of spatial appreciation.

3. How?
How do you conserve this value, and is it possible to add value through the intervention? Even ‘doing nothing’ is an active choice of how to handle with monuments. And when having determined exactly why and what you want to preserve, you need to figure out how to do that. Do you want to add something valuable from your own time for the future? Or should it be completely reversible? And should the building be used, or should it be a museum?
3. SUSTAINABILITY IS THE ANSWER, BUT WHAT WAS THE QUESTION AGAIN?

What ‘sustainability’ and ‘sustainable development’ mean can best be clarified using the historical development of the concept, which is a still ongoing process of growing awareness of a problem, and efforts to try and find a solution.
STATE OF THE WORLD

RESOURCES

INDUSTRIAL OUTPUT

POPULATION

FOOD

POLLUTION

1900  2000  2100
Today the word ‘sustainability’ seems to be on everybody’s lips. Awareness of the need for sustainability, whatever that is, has been raised to greater or lesser extent throughout the world. While trying to find the exact meaning of the terms sustainability and sustainable development, I will go back to the first time this concept was introduced to the world. Or, to the first time the dilemma was phrased to which sustainable development would be the answer.

In 1968 the Club of Rome, a small group of international professionals from the fields of diplomacy, industry, academia and civil society, came together to discuss their concerns about the prevailing attitude of short-term thinking in international affairs, and, most importantly, their concerns about the seemingly unlimited resource consumption in a world of limited resources. The members agreed to spent the next year to raise awareness with world-leaders and major decision makers on these issues. The members of the Club of Rome used the concept of systems-thinking, to understand why and how these critic processes where taking place. This way they could explain the long-term consequences of growing global interdependence.18

In 1972 the report “The limits to growth: a global challenge” was published by a group of systems scientist from the Massachusetts Institute of Technology, commissioned by the Club of Rome. This report was the result of studies on the then growing rate of the world population, industrialization, pollution, food production and the depletion of natural resources. From all these different variables, the development between 1900 and 1970 was assessed. After that, these growing trends were continued, assuming there would be no major changes in the physical, economical and social relations. The outcome of this study showed that natural resources would be exhausted within the near future, which would put a halt to the industrial growth. Furthermore, although at first the world population would increase further for some time, later on the world population would start to decrease, because of problems occurring with food supply and health care.19

The publication of “The limits to growth”20 raised an awareness of the fact that the earth’s resources are limited, and that industrial development depends on these natural resources. It was the start of a still ongoing realization process of the consequences of this fact for our current way of living, in all layers of society.

18. Johnson (2009)
19. Meadows and others (1972)
20. And shortly after that the 1973 oil crisis.
3.2 | OUTLINING THE SOLUTION

The next step in this important process, was trying to find a solution to the problems that were established by the Club of Rome and their "The limits to growth". The outline for the solution was laid down in 1987 in the report "Our common future". This report was the result of the assembly of the World Commission on Environment and Development, presided by Mrs. G. H. Brundtland, then prime minister of Norway.

The object of the commission was to give an outline to change the present pattern of development, because the present pattern of development does not suffice anymore for different reasons. Firstly, the present pattern of development will not solve the acute problems of mass poverty and the gap between rich and poor nations is widening. Secondly the growing threats to the environment raise crucial questions of planetary survival. In the report the vast achievements since environmental protection had become a primary concern of the United Nations were stressed, but also the insufficiency of the available remedial methods was recognized, mentioning that "the complexity, the magnitude and the apparent irreversible trends of environmental degradation surpass present conception." 

The outline of the solution that is given in “Our common future” was than posed as the - political - concept of sustainable development. The definition of the concept was based on the already used environmental definition, but was extended to a much broader concept, expressing the hope to “open new doors to perception and entail new inspiration for humankind in its quest for progress and survival.”

The following definition of ‘sustainable development is than given:
“We define sustainable development in simple terms as paths of progress which meet the need and aspirations of the present generation without compromising the ability of future generations to meet their needs.”  

The innovation of this concept of sustainable development, was that it is not seen as a solemnly environmental concept, but very importantly also as a social and economic concept as well. Also the conclusion that the problems are worldwide and that they are a matter of global interdependence, was of great importance. The report therefore calls for close collaboration between world leaders, because “Disappearing forests are not of concern only to the countries where the forests are cut. The depletion of the earth’s ozone layer, acid rain and nuclear fallout are common concerns. Human progress now demands that we realize that we are neighbours on a small fragile planet, and that our duty of care for each other is not only a mutual moral obligation, but also in our self-interest.”  

---

23. Ibid., p. 4
24. Ibid., p. 13
3.3 | ELABORATING THE CONCEPT OF SUSTAINABLE DEVELOPMENT

After the formulation of this concept of sustainable development, the need for a practical elaboration of the concept rose. A range of definitions of sustainability and sustainable development has been defined since then. A widely accepted scientific consensus on the topic was reached in 1992, with the definition of the four principles of sustainability by the Swedish scientist Karl-Henrik Robèrt. They were named, after the organization promoting it, ‘The natural step framework’. The four principles represent four System Conditions which are necessary for sustainable development. These system conditions are currently stated as follows:

In the sustainable society, nature is not subject to systematically increasing...
1. ... concentrations of substances extracted from the earth’s crust,
2. ... concentrations of substances produced by society,
3. ... degradation by physical means and
4. ... people are not subject to conditions that systematically undermine their capacity to meet their needs.  

The principles are based on the scientific foundation of the Laws of thermodynamics and studies of humans as a social species. The fact that there is already a deep rooted societal consensus about the Laws of Thermodynamics, and that The Natural Step Framework is only an extrapolation of these laws to practical problems, accounts for the authority of these principles of sustainability. Also the principles were defined and refined through consultation with members of the wider scientific community, finally reaching a consensus position.

In 1995 John Elkington formulated the three elements of sustainable development as described above as People, Planet, Profit, as part of the triple bottom-line concept. This concept indicates that organizations should take the three aspects equally into account in their business.26

The formulation has been widely accepted, but in 2002 for the World Summit on Sustainable Development, Profit was changed into Prosperity, to be able to also take into account social profits along with economic profits.27

26. Duijvestein (2008b)
27. UN Department of economic and social affairs (2003)
3.4 | QUANTIFYING SUSTAINABLE DEVELOPMENT

Slowly we are trying to grasp the extent of the problems that we are facing, and with that the dimensions of the needed change. In 1993 professors of the Delft University of Technology Jansen and Van Heel gave an idea of the extent of necessary change in the next 50 years, by trying to quantifying the task of sustainable development, in this case decreasing the environmental pressure.

The pressure on the environment was captured in a formula, linking the necessary amount of environmental goods per unit of prosperity, the average prosperity per head of the population and the size of the world population.

\[ D = M \times W \times B \]

- \( D \) = total pressure on the environment;
- \( M \) = the necessary amount of environmental goods per unit of prosperity;
- \( W \) = the average prosperity per head of the population;
- \( B \) = the size of the world population

In the next 50 years the world population will probably increase by a factor 2 or 3, and the average prosperity per head of the population will also increase, this by a factor 4 to 8, the last as a result of the development of the second and third world. At the same time the pressure on the environment, \( D \), cannot increase any further, and is preferably reduced by a factor 2. Altogether this means that \( M \), the necessary amount of environmental goods per unit of prosperity must be reduced by a factor 8 to 50.  

This concept has become widely known as the ‘factor 20’, in an attempt to express the extent of the task at hand. In order to halve the environmental pressure, the environmental impact of all our activities needs to be reduced by this factor 20. At the beginning of the nineties of the twentieth century, the Dutch government set as a line of policy to have reduced the total environmental pressure by a factor 2 (!) in 2030.  

The troubles that are now emerging with trying to achieve this factor two, indicate the need for the implementation of truly innovative solutions in order to ever come closer to achieving that factor twenty.
3.5 | INNOVATION

The change into a sustainable society can only be achieved if large parts of the elements on which current society is built are renewed and replaced by sustainable alternatives. This means that there is a need to innovate in all manifestations of society.

In order achieve this, two fundamental steps need to be taken. The first is the invention of the innovation, and the second is the adoption of the innovation by society as a whole.

The latter is referred to as the diffusion of innovation, a concept which Everett Rogers has elaborated in his book 'Diffusion of innovation' in 1962. Rogers defines this concept as "the process by which an innovation is communicated through certain channels over time among the members of a social system." 31

Key elements in the theory are: the characteristics of the innovation, the types of communication channels to get information from one individual to another, the rate of adoption, and the social system which frames the invention process.

First the decision has to be made to diffuse an innovation by the initiators. After that the process of adoption of the innovation by individuals has to start. If, after a certain period of time, a certain percentage of the members of a social system have adopted the innovation, the critical mass has been achieved, after which the continued adoption is self-sustaining.

There are several strategies to reach critical mass for an innovation, for instance:
- the innovation is adopted by a highly respected individual in a social network,
- an instinctive desire for the innovation has been created,
- the innovation is injected in a group of individuals who would readily adopt the innovation,
- positive reactions and benefits for early adopters are provided.

Also, innovations have distinctive characteristics that influence an individual’s decision to adopt or reject it:
- the relative advantage: the improvement over the previous generation,
- compatibility: how well an innovation can be assimilated in an individual’s life,
- complexity: the ease with which an innovation can be adopted,
- triability: the ease with which can be experimented with the innovation during implementation,
- observability: the visibility of the innovation to others in a social system.

Also the individuals within a social system have different characteristics, that determine their tendency and likeliness to adopt an innovation. There are five categories, divided according to their place in the process of innovation diffusion.

30. Jansen (2008) The first, stimulating the emergence of innovation, is a very important, and very extensive field of study. I will not further elaborate on this topic because it does not fit within the scope of my studies, but I can refer to, for instance, an article by Prof. Leo Jansen on Meeting the challenge of sustainable development. He mentions the importance of the right organization of the educational system as an important factor in the enabling of innovation.

31. Rogers (1962)
32. This can be an individual, a group or an authority.
The first category is that of the innovators, they are the first individuals to adopt the changes. Innovators are high risk takers, often young of age and have a high social status. Also very important is that they are in closest contact with scientific sources and other innovators. The category that will after that adopt the innovation is that of the early adopters, these include individuals that have the highest degree of opinion leadership. They are younger of age, have a higher social status and are socially forward. Another characteristic is an advanced education. When the early adopters have adopted the innovation, the early majority will follow. The early majority is in contact with the early adopters, but has a slower adoption process. They have an above average social status and possess some degree of leadership. Important for the next category, the late majority, is that they have a high degree of skepticism. Additionally they have a below average social status and a very low degree of opinion leadership. The laggards are the last category of individuals that will adopt the innovation. Laggards are often advanced in age, and focused on tradition. They only have contact with family and friends, and usually have an aversion to change-agents.
3.6 | CONCLUSION AND REFLECTION

Since the inception of the concept of sustainable development, it has increasingly become to mean many things to many different people. Therefore, when I started out my research into this subject, I didn’t have a clear image of what sustainable development was really about. Going back to detection of the problem which sustainable development is the answer to, brought a better understanding of the problem and of the steps already taken towards the solution.

In the end all elaborations of sustainable development come down to this. If we carry on our current way of living, we won’t be able to maintain the level of welfare as we now know it, because we are overusing the earth. In addition to this, the welfare we know now isn’t equally distributed over the world population. Differences are found in the definition of what this welfare should be. And what exactly is the overusing of the earth, and what the effects are. And: who should bring the solution? Possible solutions are found in trying to change our way of using the earth’s resources and by reducing the need to use the earth’s resources.

In any case, the dimension of this problem calls for radical changes in all human activities. These changes need to be innovative, because the solutions that we are now capable of will not suffice. Also, the changes need to penetrate into the entire world population, otherwise it still will not suffice. A key role in the chances of successfully implementing these innovations in society is played by the way innovations are implemented and introduced into the direct living environment of individuals.
Now the political concept of sustainable development needs to be translated into changed human behaviour. Reducing the environmental load of the built environment is an extensive part of the problem. This includes not only changing the way we build now, but also reducing the environmental load of our existing building stock.
4.1 | REDUCING THE ENVIRONMENTAL PRESSURE OF THE BUILDING STOCK

Almost all of our activities comprise of the construction of and take place in the built environment, which means that reducing the environmental load of the built environment is an extensive part of the problem. The exact environmental pressure caused by the building industry is hard to define, because the effects of the activities of this industry are so comprehensive. The effects caused can be divided according to the different phases of the lifecycle of a building or structure, being: construction, use, renovation, (re)use and demolition.

As mentioned, the use of the building also adds to the environmental burden. The size of the contribution depends partly on the behaviour of the user(s), and partly on the building itself. The way a building is constructed can influence the environmental pressure, by influencing the quantity of the use of energy and (tap) water.

In order to start reducing the environmental load, caused by construction activities and the use of the built environment, the concept of ‘sustainable building’ was introduced. According to the definition of the Dutch Ministry of Housing, Spatial Planning and Environment (VROM), sustainable building means developing and managing the built environment, with respect for people and the environment, and by that is part of the quality of this built environment. Sustainable building has a bigger scope than for example building energy neutral. Building energy efficient is an important part of sustainable building, but it’s also about a healthy indoor climate, choice of materials, prevention of resource depletion, and making a responsible use of water. This not only applies to individual buildings, but also to neighbourhoods and cities. Not only the environmental effects, but also the health and wellbeing of people in both the interior and exterior of the built environment are taken into account.\(^{33}\)

Sustainable building can lead to a reduction of the environmental burden caused by the construction and use of the built environment. Consequently it should be taken into account that, when looking at the Netherlands, every year less than 1% of the total amount of existing buildings is added by the construction of new buildings.\(^{34}\) Renewing the entire building stock at once, or waiting until it has been completely replaced by new buildings are unfeasible options. Also, the environmental effects caused by demolishing and replacing parts of

---

33. VROM (2009)

34. CBS (2010)
a building are often neglected, beneficiary to building related energy use, when calculations are made to determine the environmental impacts of a building.\textsuperscript{35} This calls for a new kind of sustainable building, that is aimed to at least reducing the environmental effects caused by existing buildings: sustainable transformation.

The transformation of the existing building stock to make it more sustainable, is a very extensive task and with that complex. Due to the wide range of buildings and building types, a standard solution cannot be found. It is possible though to make a rough division based on the period in which was build, because there are similarities in ways of constructing. Roughly 55% of all buildings was built after 1970, 25% was built between 1945 and 1970 and 20% of all buildings was built before 1940.\textsuperscript{36}

Between these categories are large differences, which lead to three different focus points for the transformation task at hand. The buildings that were built after 1970, have been built under regulations with set standards for insulation measures, because there was already an awareness of the need to reduce building related energy use. The period between 1945 and 1970 was the period of reconstruction after the war. This has led to specific types of buildings. Lastly the period of buildings that has been built before 1940. These buildings, although highly differentiated, have in common that they are built using traditional building methods and that they were built without any regulations on energy efficiency. This category is particularly interesting because of the large part of heritage buildings it contains, and the overall appreciation of these buildings as qualitative elements in the built surroundings.

As mentioned, the existing buildings stock is very differentiated, and there are no one-size-fits-all solutions. Similarities to frame the solution set, can be found based on construction type. Another important factor that influences the possible solutions is the fact if a building is listed or not.\textsuperscript{37} Reducing environmental effects and listed buildings are often unjust seen as incompatible, leading to missed opportunities to reduce the environmental load of the existing building stock.
4.2 | ENVIRONMENTAL EFFECTS

The environmental effects that are caused by activities concerning the built environment, can be divided according to the different phases of the lifecycle of the building: construction, use, renovation, (re)use and demolition. During these phases various processes cause pressure on the environment. For example during the construction and demolition phase these processes are: the production of building and demolition waste; the emission of volatile organic compounds; the use of energy during the construction phase; the use of tap water during the construction phase; emissions to soil and groundwater due to the leaching of used materials; the building activities affect the liveability of the (urban) surroundings; disturbance of the landscape is caused by realizing the building site; disturbance of the landscape by the extraction of surface quarrying materials. All these processes cause the environmental impacts that are so important to reduce, because they comprise the depletion of the environment. Usually ten environmental effects are distinguished:

1. the depletion of abiotic resources
   When non renewable resources are used, depletion occurs. The rate at which non renewable resources originate, is much lower than the rate at which they are consumed.

2. global warming
   The greenhouse effect, caused by the increased discharge of CO2 and methane, produces a worldwide rise in temperature.

3. ozone depletion
   Among others, CFC’s (chlorofluorocarbons, or freon) from for instance refrigerator systems break down the ozone layer.

4. photo-oxidant formation
   This smog formation causes respiratory problems. In summer caused by among others ozone and volatile organic compounds, in winter caused by sulfur dioxide and aerosols.

5. human toxicity
   Related to the emission of substances that are toxic for humans.
6. aquatic ecotoxicity, 7. sediment ecotoxicity, and 8. terrestrial ecotoxicity

Ecotoxicity is caused by the discharge of metals such as copper, chromium, zinc, lead and mercury in salt or fresh water and in the soil. The metals have a negative impact on the organisms that live in this water and soil.

9. acidification

Acidification, by emissions of sulfur dioxide, nitrogen oxide and ammonia, affects forests and heather, and pollutes water and the soil.

10. eutrophication

Caused by the overproduction of nitrates, phosphorus and nitrogen, which end up in the surface water. There the presence of these substances cause the growth of algae, causing a decrease of the biodiversity in the water.  

The depletion of the environment, caused by activities related to the built environment, is related to material use, energy and water consumption. Important to realize is that the use of energy, water and materials are no environmental impacts in itself, but they cause several environmental impacts. Considering the structure of this system, this means that the focus for the design of a sustainable building should be on the controlling of the flows of energy, water and materials, but that the impact of these measures should be considered in terms of the caused environmental effect.
4.3 | PEOPLE, PLANET AND PROSPERITY

When comparing my findings on the practice of sustainable building that I’ve been confronted with, one thing in particular came to mind. The innovation of the Brundtland report 41 was that it brought an insight in the overall interdependence of humanity and nature. The insight that we could only sustain our existence if we recognize the interdependence of the aspects of people, planet and prosperity, was fundamental. In my opinion we have lost sight of this very important realization in the process of practical elaboration of the theoretical concept. Illustrative for this is the development of the terms People, Planet and Prosperity. These terms were introduced by John Elkington in 1995 in the context of his triple bottom-line concept that indicates that organizations should take the three aspects equally into account in their business. In the mean time, the concepts have taken off on their own, and are used independently from the triple bottom line concept. This has led to an increasing removal from the fundamental understanding of interdependence. Surely, the three terms are taken into account when designing a sustainable building, but they are treated as separate concepts. In my view this development is not desirable.

41. See chapter 3: Sustainability is the answer, but what was the question again?

4.4 | DESIGN STRATEGIES FOR SUSTAINABLE BUILDING

Through the years a wide range of design strategies for sustainable have been developed by various authorities. I have done an analysis of the tools to design for sustainable building that have been selected from two lists of tools, the ‘Verklarende begrippenlijst duurzaam bouwen en verbouwen’ by VROM and ‘Instrumenten beoordeling en promotie duurzame kantoren’ by Senternovem. Although they all strive to give the people that are involved in the building process the handles to build sustainably, every strategy or tool has been developed from a different starting point and has a different focus. Overall I found that a distinction can be made between two types of design strategies. There are the tools that give general guidelines or aim to work to, and there are the tools that give a set of specific measures. The interpretations obviously differ widely.
An example of a strategy that gives very general guidelines, is the Trias Ecologica that was developed by BOOM together with the SOM department of the faculty of architecture of the TU Delft. It represents a way of thinking and acting as per three steps. The method can be used when building, dealing with materials, energy, water, health and so on. A very important derivative is the Trias Energetica. The main idea is to limit the ‘in’ and ‘out’ flows as much as possible, always in three steps. These guidelines are very general and are versatile applicable.

**IN**
1. Limit the demand: prevent unnecessary use
2. Use sustainable / renewable resources
3. Use finite resources wise

**OUT**
1. Prevent waste
2. Reuse waste
3. Process (remaining) waste wise

An example of a design tool that gives a set of specific measures is the DCBA-method. The DCBA-checklist gives a general overview of the choices that have to be made during the design process, divided in different categories: energy, water, green, construction materials, environment (inside) and social security, construction and demolition waste, domestic waste and information. The DCBA-method is also called the four-variant method as it entails four levels of sustainability: the level D, C, B and A.

The D level is the normal situation, where there is no environmental concern at all. For the C level it means corrected normal consumption, where the environment is taken into account. B level means restricting damage to a minimum, taking the environment as the point of departure. An A level would mean the absolute best situation, where maximum sustainability is reached as regards to a particular aspects.

The main difference between these two types of design tools is that, the first describes a way of thinking that can be interpreted freely by the designer. The second is more a practical handbook that supports the designer with practical knowledge. Both kinds of tools are relevant in different stages of the design process, but are both relevant.

---

42. VROM (2009)
43. Aalbers, et al. (2001)
HIGH Du 183 \(\times\) HIGH Mo 1.5 \(\Rightarrow\) DuMo-PROFILE = 275

HIGH Du 222 \(\times\) LOW Mo 0.75 \(\Rightarrow\) DuMo-PROFILE = 167

LOW Du 90 \(\times\) HIGH Mo 2.0 \(\Rightarrow\) DuMo-PROFILE = 180
Recently a handbook for sustainable monument care has been published by the SBR, the ‘Guide to sustainable monument care. theory and practice of sustainable monument maintenance’\textsuperscript{44}. In the preface of the guide it is emphasized that there are many similarities between monument care and sustainable building, pointing out the common goal of both disciplines to keep the planet, including the built heritage, safe for next generations.

The structure of the guide clearly reflects its origin in the current governmental practices of both sustainable building and monument care.\textsuperscript{45} The reason for developing the method was that the government wanted to perform a GreenCalc+ sustainability check on the buildings that were listed, which is common practice for all other buildings in their envelope. Until then, the GreenCalc+ method didn’t suit listed buildings, because the additional requirements that are set for listed buildings couldn’t be taken into account.

Nibe, the Dutch Institute of Building biology and Ecology, had developed the GreenCalc+ methodology, and was asked to make an adjusted version. The GreenCalc+ tool is an instrument to measure the degree of sustainability of a building, based on ratings for material, energy and water use. The ratings are based on integral Life Cycle Assessments, to make interventions of different nature comparable.\textsuperscript{45} To make the GreenCalc+ tool fit for listed buildings, Nibe devised a way to even out the score for sustainability with the historic value of a building. This has led to two indices: one sustainability coefficient (‘Du-coefficient’) and one coefficient for the monumental value (‘Mo-coefficient). Putting these two together gives the DuMo-profile. The interplay between the sustainability coefficient and the coefficient for the monumental value in this DuMo-profile is illustrated in the figure. The calculations that lead to the sustainability coefficient need to be done by professionals from the governmental department for sustainable building, the coefficient for the monumental value needs to be determined by the people specialized in the care for monuments.

\textsuperscript{44} Nusselder, Ven, Haas and Dulski (2008) ‘Handboek duurzame monumentenzorg. Theorie en praktijk van duurzaam monumentenbeheer’

\textsuperscript{45} Sureac (2010)
The guide also offers twenty strategies to improve the GreenCalc+ score, within the restrictions set by the authorities on monument care.

The strategies are:

1. Traditional performance
2. Minimal interference measurements
3. Reversibility
4. Fitted use
5. Adjusted comfort demands
6. Reuse of materials
7. Traditional or environmentally sound materials
8. Adjacent unheated space
9. New installations
10. After insulation
11. Use or infiltration of rainwater
12. Drinking water saving
13. Utilize high spaces
14. Limit harmful emissions
15. Protection of plants and animals
16. Informing users
17. Regular maintenance
18. Interaction between Du and Mo
19. Balancing interests
20. Fitting the restoration strategy to the DuMo-profile

The twenty strategies that are offered were based on practical experience that was obtained in trial projects, where they had been able to improve the score that was obtained for the DuMo-profile, using these strategies. This part of the guide was not written by Nibe, but was put together by the government service for monument care. This is reflected because the guide offers a great deal of technical information, aimed at the technical conservation of the historic buildings, but that it lacks an onset for integral design.
In the description of the strategies also the underlying view on monument care emerges. Recurrently, the reversibility principle is put forward as the most sustainable solution. This in my opinion makes the guide rather restricted, because it is only applicable if this view on monument care is shared. Also, in the line of this study it could be said that applying the reversibility principle consistently in every case detracts from the aim to reach historical continuity. One main reason for the promotion of this principle in the Guide is the concern that after a series of interventions in the monument, the cultural historic value will have been reduced. This is a just concern, but I think that the degree of reversibility should be adapted to the lifetime expectancy of the intervention. Also interventions shouldn’t be judged on their level of reversibility, but on the quality of the addition. In old times, the adaption’s also weren’t reversible, and now we appreciate this because it shows us how the building has ‘lived and grown’ through the years.
In my opinion, the whole purpose of sustainable development is that we continue our existence on this planet and live happily ever after, and that so will our children, and our children’s children.
5.1 | THE IMPORTANCE OF BUILT HERITAGE FOR HUMAN DEVELOPMENT

By not presuming the existence of monument care, but by questioning why this phenomenon has emerged, I have come to an understanding of its importance for society.

Humanity will always try to explain its own existence and that of the world around him. This is a need that is fulfilled partly by our insight in our history, partly by science, and partly based on spiritual manifestations like religion. Our knowledge of history that contributes to this sense of understanding consists of our conscious knowledge (‘the history books’) and from an overall feeling of foundation, both for an important part fuelled by the historic built environment. Both are equally important and have to be acknowledged in order to safeguard the elements in our surroundings that provide in this need.

The need for this connection with our history is not only of importance for our wellbeing today, it is also of importance for our future. It provides us with precedents and a context to put developments up against. We can try to take an example from the successes, but also to try to learn from our mistakes. As mentioned before, the definition of historicism in social sciences implies that the future is locked in and predetermined by history. Karl Popper, who is generally regarded as one of the greatest philosophers of science in the 20th century, published ‘The poverty of historicism’ in 1957. This was a manifest to reject the attitude of historicism, for he thought it to be of danger for a healthy development of society, because it would impede the range of possibilities that lie open for the future.

This presumes history as a static concept, that can’t be altered. In my opinion, in light of all the above, history is not as fixed and indisputable as it may seem. History is an interpretation of the world around us, and therefore changes along with the interpreters. And if that is so, than the interpretation of history will not limit the possibilities, but will only enrich them. And with that make the preservation of the material pieces that are left of history, as unbiased witnesses of history, and the inclusion of them in daily life of vital importance for human development.

I also see another opportunity for heritage to take up a key part in the transformation of society in a sustainable society. Not only can it inspire towards innovative solutions, but it can also, provided that it is applied well, be the link between the innovation and the adopting society.

The energy system will need to change drastically in the coming fifty years. These vast changes need a historical carrier to bed them into existing society. A very suitable saying is: most people are in favour of progress; it’s the changes they
don’t like. If our surroundings change too much we don’t feel safe anymore, because we lose that overall feeling of foundation.

If we now put together these conclusions about the necessity of inclusion of historical and monumental buildings in our daily life with the final goal of sustainable development, we can see that something is missing our current elaboration of the concept of sustainable development. If we want to be able to provide for our needs now and in the future, providing for historical continuity through the inclusion of heritage buildings in our daily life is of vital importance both for our present well-being, as for our progress towards the future.

5.2 | HISTORICAL CONTINUITY

Based on the previous, I have concluded a few things. Firstly, humanity has more basic needs than just being able to provide for food and shelter. The feeling of historical continuity is one of those basic needs. If sustainability means being able to meet the needs of present and future society, than historical continuity should also be part of sustainable development.

Historical continuity is based on an interdependence between past, present and future. In the context of our built environment this means that there should be a balance between keeping history and adding to history in order to prepare for the future. We need to deal with our heritage trough these three layers of time, which means dealing with the dilemma’s of monument care concerning our heritage and adding to that heritage.

As mentioned before the acclaimed principle of reversibility does not attribute to the concept of historical continuity. If this principle is applied in every case this would cause a weak link in the connection between past, present and future. In my opinion, in order to keep our heritage safe and to include it in our daily life, we need to enlarge the heritage. This principle of enlarging the heritage was beautifully described by the Roman philosopher Seneca: “But we should play the part of a careful householder; we should increase what we have inherited. This inheritance shall pass from me to my descendants larger than before. Much still remains to do, and much will always remain, and he who shall be born a thousand ages hence will not be barred from his opportunity of adding something further.”

(See inset on the next page for the extended version of this citation.) This view on heritage gives rise to another way of thinking about interventions in monuments. It calls upon the responsibility of the architect to design an enduring valuable intervention. The task would be not only make the building fit for the future, but also to add cultural value, in order to enlarge the heritage.
Hence I worship the discoveries of wisdom and their discoverers; to enter, as it were, into the inheritance of many predecessors is a delight. It was for me that they laid up this treasure; it was for me that they toiled. But we should play the part of a careful householder; we should increase what we have inherited. This inheritance shall pass from me to my descendants larger than before. Much still remains to do, and much will always remain, and he who shall be born a thousand ages hence will not be barred from his opportunity of adding something further. But even if the old masters have discovered everything, one thing will be always new, the application and the scientific study and classification of the discoveries made by others. Assume that prescriptions have been handed
down to us for the healing of the eyes; there is no need of my searching for others in addition; but for all that, these prescriptions must be adapted to the particular disease and to the particular stage of the disease. Use this prescription to relieve granulation of the eyelids, that to reduce the swelling of the lids, this to prevent sudden pain or a rush of tears, that to sharpen the vision. Then compound these several prescriptions, watch for the right time of their application, and supply the proper treatment in each case.

The cures for the spirit also have been discovered by the ancients; but it is our task to learn the method and the time of treatment. Our predecessors have worked much improvement, but have not worked out the problem.

Seneca in:
Moral epistles,
letter LXIV ‘On the philosophers task’
5.3 | THE TRIAS CULTURA: GUIDANCE FOR SUSTAINABLE MONUMENT CARE

During my research there seemed to be a recurring problem with all projects concerning sustainable monument care. The fact that no monument is the same, and that every monument needs a tailored solution, seemed to result in losing sight of the bigger picture. This makes for a chaotic design process, which is partly unavoidable because of the above mentioned, but it also results in a chaotic design that doesn’t portray an integral solution or idea.\(^{51}\)

To try to prevent this de-railing of the design process, there is a need for a guiding principle or ‘red thread’, so that any time during the design process every decision made can be seen as part of the bigger picture, and with that also the effect of the individual design decision in the bigger picture.

In my opinion this requires a deep understanding of the underlying problems that need to be solved. For instance, when dealing with monuments, often the first step is looking at the description of the historic values which has led to the listing of the building. As the design process progresses we pin ourselves on that description, forgetting why it is that these descriptions are made in the first place. Had we been more aware of that, we could have justifiably questioned the monument description and keep the immaterial values even better.

The same counts for designing for sustainability. If sustainability hasn’t been taken as the starting point for the design, and sometimes even if it has, the measures taken are often assemblies of separate technical solutions. Why those technical solutions were invented in the first place, has drifted from sight. This can even lead to ineffective application of the solutions.

In the previous chapter I concluded that the tools to design for sustainability could be divided in two types. They range from providing practical solutions to setting out a certain way of thinking that can be freely interpreted by the designer. In this context the Guide for sustainable monument care gives a set of practical measures, but also lacks an onset for integral design.

Monument care and design for sustainability are both disciplines that are filled with dilemma’s. Also in both disciplines every problem or case should be completely viewed on itself, there are no standard solutions. Every interventions should be sought for the chances and possibilities that arise from the combination of the specific attributes of the assignment, object and its context. It is important to ask the right questions in order to retrieve the right information to find these chances and possibilities.

\(^{51}\) Based on the interviews with Tjeerd Deelstra and Birgit Dulski. Deelstra (2010), and Dulski (2010)
PRESENT → FUTURE

ENLARGING THE HERITAGE
= added cultural value
= fit for the future
→ Energy, water, materials and ecology are part of an integral design

KEEPING IMMATERIAL VALUES THROUGH KEEPING MATERIAL
→ Implies measures taken for energy, water, materials and ecology

KEEPING THE MATERIAL VALUES
→ Implies no measures for energy, water, materials and ecology

PAST → PRESENT
Now I have set out a frame of mind that can be used as guide for integral design for sustainable monument care. It is a constant reminder of the larger context that the individual intervention should be seen in. It sets out a path of three conditions that need to be met in order to close the link between past, present and future, thus providing historical continuity. I have named this framework the Trias Cultura, obviously as a reference to the Trias Ecologica and its derivatives, also to point out that culture and historical continuity should be put on the same level as energy, water, materials and ecology when talking about sustainability. The three steps of the Trias Cultura can be described as follows.

1. Keeping the material values
This implies the 'standard' monument care measures. Only the material values like the age of the material is taken into account.

2. Keeping the immaterial values through material
In order to keep the immaterial values, it is necessary that the building is in use, because immaterial values arise from the interaction between people and the material. The value of the material is now additionally determined by the experience of the material by the user.
This implies measures taken for energy, water, materials and ecology because otherwise rather sooner than later the building will be out of use because for instance energy bills are too high.

3. Enlarging the heritage
Does the design add a valuable cultural element to the built heritage? Is it made fit for the future? Does the design anticipate and contribute to the change of society into a sustainable society, with sustainable activities? This requires integrated measures for energy, water, materials and ecology in the design.
6. DESIGN REFLECTION

My design process has been a constant struggle trying to apply the preceding theoretical framework to the sustainable design for an intervention. In this chapter I reflect on how I went from research to design, and in the end what making this design has taught me about the theoretical framework.
6.1 | FROM RESEARCH TO DESIGN

The gap between theoretical research and design can be bridged by the right analysis of the specific design assignment. After finishing the research I therefore set out to find the right analysis tool to provide the information required to make a design according to the Trias Cultura. This means gathering information about the material values, the immaterial values and how to enlarge the heritage and make the building fit for the future. As a starting point I took the Analysing Buildings from Context to Detail in time, as developed by H. Zijlstra 58.

The ABCD research method

The ABCD research method deals with both building and the context trough the three layers of time. A total of nine themes (brief, site, architect, typology, design process, space, structure, materials, services) that are analysed over three layers of time (‘meant to be’, ‘has been’ and ‘to be or not to be’) are put together in the ABCD matrix (see figure).
Research matrix for sustainable monument care
In order to make the scheme suitable for the Trias Cultura, I have adjusted the
matrix.
The ABCD method was developed within the context of ‘modern heritage’; post
war architecture in the Netherlands. This was the first thing that didn’t correspond
to my case, because my focus is on heritage buildings from before the war. One
major difference between these groups is the fact that post war architecture was
mostly designed by a specific architect, often using a specific design concept
or construction principle. A large part of the buildings from before 1940 where
not created by a specific architect. Also, the current state of the building is often
already many changes further from its original state.
In my version of the matrix I therefore have removed the theme ‘architect’ and
this information is now captured in the theme ‘design process’. Design process
deals with the why and how a building was constructed, and why various building
phases where initiated.

In the introduction to the research matrix, Zijlstra mentions the description of a
building made by Wouter Vanstiphout. He describes the building by transcribing
his experience as he walked through the building. Zijlstra dismisses this method
of analysis, on grounds that it does not do justice to the past, without which the
building as it is experienced by Vanstiphout in the present had never come to be.
This is a just comment, but I also think that the ABCD-research matrix doesn’t
address sufficiently the qualities that the building has accumulated over the
course of the years. If these qualities are stipulated, this would also describe the
immaterial values that the building possesses.

Furthermore, Zijlstra mentions the importance of multidisciplinary analysis, in
specific constructional analysis. In the context of my own research it would be
useful to add sociology and environmental psychology to the list of disciplines.
These disciplines can be useful to create understanding of the interaction between
people and the built environment, which in my opinion is very important when
intervening in existing buildings. So instead of the theme ‘brief’, now ‘society’
is introduced, because the context of a building is not only determined by the
physical component, but also in the context of the society that affects the building.

The last column of the research matrix ‘to be or not to be’ concerns the
possibilities for the regeneration of the building. Regeneration concerns changes
which add a new period, or generation, to the lifecycle of the building. In my
opinion this description is a bit to narrow. In my opinion this way only the
intervention at hand is taken into account, and the matter is only viewed upon from the perspective of the building. To provide the right input for the Trias Cultura the scope should be expanded further into the future, and also developments in society should be considered. Future scenarios are wide ranging prospects about what the world could be like in the future. Taking into account future scenarios while designing can be useful to look beyond the near future of the intervention at hand.

The adjusted matrix now holds eight themes: society, typology, design process, site, structure, space, materials and climate. These themes are looked upon over three layers of time. The first layer ‘has been’ describes a development, maybe even a development pattern. The second layer is that of the present, of what ‘is’. This would be a thematic value assessment of the sum of the qualities that the building has accumulated over the years. The last layer ‘could be’ should give an insight in the possible development of the (physical and societal) context and the possibilities that the building itself offers to maintain in this changing context.

This last column describes a search for possibilities and already gives an onset to design. To focus this search for possibilities even better I have added a third dimension to the matrix. Using principles from design for sustainability, one can systematically look for chances where the monument and design for sustainability overlap. For this I have used the principles of Climate Responsive Design. CRD considers the building as an intermediate between people and their environment, which provides people with a certain amount of comfort. The external factors at hand, like the sun, the atmosphere, wind, the earth and water, can be obstructed or promoted in the intermediate of building skin, in order to provide the desired comfort in the interior of the building. This way an energy balance can be accomplished between the available external energy providers and the energy needed for heating, cooling, etc. to provide the desired comfort level inside the building.

By adding this dimension of design, the matrix would frame a constant interaction between analysis, value assessment and design, slowly gathering the input required for a design according to the Trias Energetica.
6.2 | GRASPING IMMATERIAL VALUES

A key concept in this research is that of the immaterial values of a building. In my efforts to translate the research to design I found that I needed a method to assess the immaterial values of a building. Thinking about these immaterial values has led me to believe that buildings can be, just the same as people, more or less eloquent. Some buildings can express themselves better than others, these buildings speak to us more. They are to more or lesser extent able to transfer a certain feeling, meaning, story or message. The ‘vocabulary’ in which a building can speak to us is composed of spatial and material characteristics. These characteristics can be analysed, and valued on this ability, as it where, to speak to us: a value assessment of the immaterial values.

Value assessment of immaterial values

The value assessment is a very important tool in monument care. It is also a very much disputed instrument, because of its inherent subjectivity. The Dutch governmental department of monument care has developed a set of fixed guidelines for building historic research and value assessment. In the explanatory document accompanying the guidelines it is stressed many times that the value assessment should be both objective and verifiable.

In my opinion there are two kinds of value assessments: the value assessment as a legal instrument, and the value assessment as a design instrument. These two are fundamentally different, because the latter does not strive for objectivity and should be seen as the, albeit very well funded, personal interpretation of an individual.

This distinction between the legal instrument and the design instrument made it possible to develop a value assessment of the immaterial values. The aim of this assessment would be value the material on their contribution to the feeling of historic consciousness that is evoked by the building. For this I have taken the perception of the space as a starting point to name five categories of spatial and material characteristics:

- spatial characteristics;
- craft work;
- material finishes;
- indoor climate;
- traces of use.

After making an inventory of these characteristics, their immaterial values can be assessed. To illustrate this I have added the assessment I have done of the immaterial values of one room of the case study.
Spatial qualities

The first category is that of the spatial characteristics. The relation between the height and width of a room, for example influences the way a room is experienced a great deal. Another very important spatial aspect in the experience of the room is the connection to other surrounding spaces. The view that can been seen from the window is also an example of spatial connection to other, in that case outdoor,
Material values

Above is a depiction of the material values of the groundfloor of the Café Laros. This is the conventional value assessment, and is largely a literal translation of the age of the concerning walls.
 Spatial values

This illustration shows the same groundfloor, but now depicts the value of the space, based on their attribution to the historical experience. It is interesting to see the difference between these two value assessment's.
Craftwork

Many scientific studies show the aesthetic quality of things that are handmade, that are crafted. This quality is closely connected to the information the craftwork gives us about the craftsman and the society he lived in.
Material finishes

Material finishes influence the experience of the space a great deal, by their feel, their structure, their physical characteristics. But also the way a material fouls, ages or deteriorates.
Indoor climate
The indoor climate is a very important communicator between building and human. The climate (light, temperature, air movement, humidity, acoustics influences the experience of the building. It also influences the sort of use and overall usability of a building or part of a building.
Traces of use
Old buildings that have been used bear the traces of that use. These traces compose an important part of the immaterial values, because they link directly to former use and the people who made use of the building. Together they form pieces of evidens by which the story of the house and its inhabitants can be composed.
6.3 | REFLECTION

After I had developed this value assessment method, the first thing I tried to do was make a literal translation of the immaterial value of the whole house. This didn’t work because of the thoroughness of the method and therefore the extensive work it would take to make this literal translation. After a while of struggling with the method I started to realize that it was not so much the physical result, as more the working method that represented the usefulness of the method. This value assessment method is both an instrument of judgement and an instrument to learn where to look, and how to identify the immaterial values. It identifies the physical handles that evoke the immaterial values, and gives onsets for the design. It helps the architect to focus his attention to these things, and makes it possible to get inspired by them, and to nourish the design with knowledge of the building and its (immaterial) context.

This value assessment does not give a ready-made recipe for a design. The gap between research and design can never be completely bridged by analysis. Analysis can bring you a long way, but in the end you are just going to have to make the leap and take the plunge. Job Roos described this as “the magical moment” in his “Discovering the assignment”. 
6.4 | DESIGN CONCEPT

A recurring theme in both my research and design has been the concept of continuity. Continuity is an important concept in both design for sustainability and monument care, but both disciplines have a completely different outlook on the term. I distinguish two different approaches to achieve continuity: by something that (seemingly) lasts forever, or something that keeps renewing itself. These two represent the contrast between durable and renewable, between conservation and reversibility, between re-use and renewable materials, etc.

Traditionally both disciplines have their own preference for one approach over the other. In my opinion, merging the two disciplines into truly sustainable monument care requires an open minded approach to these predefined dilemmas.

I have taken the contrast between these two different approaches to continuity as the starting point for my design.
6.5 | REFLECTION ON DESIGN

After finishing my design for a sustainable knowledge centre in a listed monument, I asked myself the question what it was exactly that I have tried to investigate in my design. The design has been a case study in which I have tried to translate my theoretical framework into design. In hindsight, my design has been a constant struggle with my research. Because, in theory everything was clear, but theory doesn’t equal to design without some sort of translation. Often I was confronted with the fact that even I wasn’t exactly sure what I was aiming for in my theoretical descriptions. The most important was that after making this design according to the Trias Cultura, I got a much better insight in what I had laid out, to what I was guided very much by my intuition.

With the Trias Cultura I described a three step strategy to make the connection between past, present and future, to achieve historical continuity. The first step I described was: keeping the material values. I have always described this as the conventional monument care. I hadn’t really figured out what this step attributed to historical continuity in the context of sustainable monument care. I saw it as a precondition for the next two steps. Now I realise that, to achieve historical continuity, keeping the material values is about keeping the material as an unbiased witness of history, that can be given its own interpretation for every generation.

The second step: keeping the immaterial values through keeping material.

The third step is enlarging the heritage. This step is twofold: adding cultural value and making the building fit for the future. Looking back I felt that these two steps together would comprise my interpretation of enlarging heritage, but I couldn’t yet see clearly how exactly. Now however, after applying this third step in my design, I can see what I have done.

Enlarging the heritage, I feel, is about making a building or doing an intervention that people can get attached to. A building that evokes emotions, gets people inspired. This is a core quality of historic buildings and monuments, and the main reason why I am so drawn to working with these buildings. But, although part of the quality lies in the age of the buildings and can therefore not be imitated, certain qualities can also be applied in the design for the intervention, addition or new buildings. This was what I realised constantly was trying to do in my design. And now the connection between adding cultural value and making the building fit for the future. Another key statement that I posed was: The energy system needs to change drastically in the coming fifty years. These vast changes need a historical carrier to bed them into society.
This is about embedding innovation into society. Science has already worked much progress since the inception of the concept of sustainable development, but these innovations need to be completely incorporated into society. To embed these innovative technologies permanently into society, only the knowledge you’re doing something that is good for the environment isn’t enough. An additional, more direct incentive is needed, that affects people personally. If people feel a personal connection to an object, they will take care of it and make an effort to include it in their daily life.

If we look at sustainable techniques like photovoltaic-cells, biogas installations and windmills.

As can be illustrated by these two examples of windmills. The windmill on the left picture gives us many more triggers to feel personally connected to it then the windmill on the right picture. Reflectively I see that I’ve used the following techniques in my design to design a building that gives incentives for people to care about it, to form a personal connection with the building:
- craftsmanship;
- connection to the past;
- experience;
- aging of material and structure.
Craftsmanship
Many studies show that people appreciate visible craftsmanship, and they value this also aesthetically. The craftsmanship is a visible and touchable connection to the person that crafted it, and this makes it something that people can get attached to. This feeling that another human being has put his heart and soul into something. The hand of the craftsman, but also the hand of the designer.

Connection to the past
Making sure that the building feels familiar, and that the connection to the past is tangible. This tangible connection to the past could be literally combining old and new material, but it could also mean using recognizable typologies.

Experience
The building needs to facilitate a certain positive or special experience, so that people experience emotions in the building. Because then people create memories within the building, and this will make them feel attached to the building.

Aging of material or structure
When designing the building it should be taken into account how the building will age. Designing for the building to grow old. This means that the material, but also the structure (and the structure of the layout) should be able to age gracefully. The use of the building should wear into the building. This could be things like overdimensioning, using elements to build, and not structures out of one big piece that cannot be altered.
Aalbers, K., K. Duijvestein, and van der Wagt, M.  

Beukers, E., and de Boer, M.  

Brundtland, G. H.  
1987 Presentation of the report of the world commission on environment and development.

BZK  

CBS  
2010 Woningbouw: Voorraad, wijzigingen en nieuwbouw naar voortgang, per regio Den Haag.

CBS, PBL, and Wageningen UR  

Deelstra, T.  
2010 Interview with Tjeerd Deelstra. V. Franken, ed. Delft.

Duijvestein, K.  

Duijvestein, K.  
2008b From triple P to quadruple P; the 4P tetraeder. In Research and design for sustainable development. A. Luising, ed. Delft.

Dulski, B  
2010 Interview with Birgit Dulski. V. Franken, ed. Bussum.
Ex, N.
1993  Zo goed als oud. De achterkant van restaureren. Amsterdam.

Frijhoff, W.

Grijzenhout, F.

Itard, L.
2006  Milieueffecten van renovatie ingrepen in de woningvoorraad. Habiforum.

Itard, L.
2007  Environmental impacts of renovation activities.

Jansen, L.
2008  Meeting the challenge of Sustainable Development. Research & Design for Sustainable Development.

Johnson, I.

Johnston, P., et al.

Krabbe, C. P.

Krul, W.

LivingGreen.eu
2010  LivingGreen.eu/about us.
McDonough, W., and M. Braungart  
2002  
*Cradle to cradle: remaking the way we make things* New York: North Point Press.

Meadows, D. H., and others  
1972  
*The limits to growth: a report for the Club of Rome’s project on the predicament of mankind.* Massachusetts: New American Library.

Nusselder, E J, et al.  
2008  
*Handboek Duurzame Monumentenzorg. Theorie en praktijk van duurzaam monumentenbeheer.*

Post, H.M.  
2002  

RCE  
2006  
*Redegevende beschrijving* Rijksmonument nr.519420, Café Laros, Velp

Rogers, E.M.  
1962  

Seneca, L. A.  
17-25  

SenterNovem  
2010  

Sureac, Stichting  
2010  
*Wat is GreenCalc+?* In *GreenCalc+*. M. Bijleveld, ed. Arnhem.

Thornton, S.  
2009  

UN Department of economic and social affairs, Division for sustainable development  
2003  
*Johannesburg Summit 2002.*
VROM
2009 Verklarende begrippenlijst duurzaam bouwen en verbouwen. Den Haag: VROM.

Wagenaar, C.

Woud, van der, A.
1996 De ethiek van de onthouding. De beoefening van het niets doen bij restauraties. Archis 6(33).

Xporelab