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HEIDI NORRSTRÖM

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PHD THESIS

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HEIDI NORRSTRÖM

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THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

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Department of Architecture

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Department of Architecture
Chalmers University of Technology
SE-412 96 Gothenburg
Sweden
Telephone + 46 (0)31-772 1000

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HEIDI NORRSTRÖM

Department of Architecture, Chalmers University of Technology

Abstract

About 40 per cent of the energy produced within the European Union is consumed in and by the residential and business sector, and the same applies to Sweden. Today's necessary focus on the climate issue with the concomitant energy issue connected to greenhouse gas emissions has resulted in stringent energy requirements even for preservation work on historically important buildings.

The scope of this thesis is topical. It is about our built heritage and how to preserve it. The issue is current EU directives on requirements for energy efficiency implemented into national legislation combined with a lack of national inventories defining what our built heritage consists of and its values. The question is whether the historic value of our built heritage will be lost in an effort to improve energy efficiency. An imbalance of preservation and energy interests within legislation is presented, showing that the concern is justified. A model for balancing those interests to avoid one-sided valuations is therefore proposed.

A transdisciplinary arena was created comprising multiple professions from academia as well as from practice because the scope is too broad to be covered by one discipline. A case study with multiple units of analysis was performed. The case study has been applied to restored buildings and the management of the preservation work carried out. The combined energy, architectural and preservation issues and the management have been investigated for use as part of the basis for the proposed model. Nine workshops have been carried out forming a transdisciplinary arena and together with the case study and studies of the disciplines and their methods they form the foundation from which the working model has emerged as an iterative design process. This thesis is a theoretical work based in large part on many professionals´ practical experiences.

The overall objective was to create a working model for practical application regarding the balancing of energy and preservation demands, and furthermore to design methods for management and collaboration for engaged professions, particularly architects, the conservation professions and engineers who work with the properties and values at risk of being neglected. The premise is that most buildings must be used if they are to be preserved, and improved energy efficiency for better comfort and indoor climate and reduced energy costs is a prerequisite for their use.

The aim was to design a model and methods that can provide a working environment built on transparency and mutual respect for the different professions and their skills, an environment in which participants feel free to question motives and causes of proposed actions for an enhanced understanding of their impact on specific aspects of a project and on the project as a whole. To facilitate the process, a framework for the balancing has been created consisting of documents and templates organised in a model with seven steps, intertwined with some investigated possible methods and concepts that are useful for the performance of the working model. The designed model and supporting methods can be used in various kinds of early stages in building processes, and is hence relevant for use even in countries other than Sweden.

Keywords: case study, energy efficiency, cultural historical and architectural values, legislation, collaboration, balancing model, supporting methods.

Foreword

The work with this thesis has been carried out in the Department of Architecture at Chalmers University of Technology in Gothenburg. It is a continuation and enhancement of the EEPOCH project, Energy Efficiency and Preservation in Our Cultural Heritage, financed by the Swedish Energy Agency, *Energimyndigheten.* EEPOCH is one of about twenty projects related to the new combined field of energy efficiency and conservation carried out within the national programme Save and Preserve, *Spara och bevara*.

The work has been carried out in cooperation with Heritage Halland where the conservation officers Britt-Marie Lennartsson, Charlotte Skeppstedt, Dennis Axelsson and Björn Ahnlund have been most helpful in all stages of the work. The project had an office place at Heritage Halland during the project with access to their archives. Local companies also funded some of the work from the beginning, enabling the implementation of the workshops in which they have also been participating, contributing with approved practice and theory, expertise, experience and advice. Many thanks to Eksta Bostads AB, Varberg Energi AB, Falkenbergs Bostads AB, and the municipality of Laholm. A reference group and an expert group were very helpful with designing the research methods and with corroboration of the interpretations and calculations of data and also contributed at the workshops. Thank you all so very much.

Special thanks to Professor Kerstin Barup at the Royal Institute of Art for constructive critique and discussion. The cooperation with Professor Tor Broström and assistant Professor Petra Eriksson at Uppsala University, Campus Gotland, and Camilla Altahr-Cederberg and Therese Sonehag at the National Heritage Board has been very enriching. A special thank you to Erika Johansson for discussions on the valuation process and for recommending Hélène Svahn-Garreau for workshop V. Apart from those named there were teachers, professors and doctoral candidates who reviewed and commented on the work in courses arranged by ResArc, the Swedish Research School in Architecture, and the centre Swedish Faculty for Design Research and Research Education, as well as professors and doctoral candidates within the other projects in the Save and Preserve programme. Thank you all for inspiring discussions and critique. Last but not least I want to say thank you to my supervisors Professor Michael Edén and Assistant Professor Paula FemenÌas who have guided me with their experience and great knowledge, and to my examiner, Head of Department and Professor Fredrik Nilsson. I also owe a lot of gratitude to my family Lars-Erik and Erik.

Over one hundred people from both academia and practice have participated and contributed at the nine workshops arranged within the project. Thanks to all of you for your commitment, the lecturing and the discussions. All have been absolutely invaluable and have brought the work forward step by step.

CONTENT

INTRODUCTION

SUMMARY OF PHASE 1

PHASE 2

WORKSHOPS

RESULTS

DISCUSSION AND CONCLUSIONS

Abbreviations

AI, appreciative inquiry, is a model for analysis, decision-making and change used within organisational theory.

A_{temp} is defined as the area in a building heated to +10°C or more in BBR.

BELOK, a national network for clients with premises, initiated and financed by the Swedish Energy Agency.

BBR, Boverkets byggregler, the Swedish decree with mandatory provisions for building.

BeBR, Bebyggelseregistret, a national database where buildings with historic values are registered.

BREEAM, Building Research Establishment Environmental Assessment Method, developed in the UK.

CABE, the Commission for Architecture and the Built Environment in the UK merged with the Design Council in 2011.

CMM, Coordinated Management of Meaning is a model for analysis and intervention to solve problems used within organisational theory.

DIVE, Describe, Interpret, Valuate, Enable, it is a method for area analysis in local planning, developed by the Norwegian Directorate for Cultural Heritage.

EEPOCH, Energy Efficiency and Preservation in Our Cultural Heritage, the project in which this thesis has been carried out.

GDP, gross domestic product.

IVA, Kungliga Ingenjörsvetenskapsakademien, Royal Swedish Academy of Engineering Sciences.

LCA, life cycle analysis.

LCC, life cycle cost.

LEED, Leadership in Energy and Environmental Design, developed in the USA.

NGO, non-governmental organization.

PBL, Plan- och bygglagen, Planning and Building Act, the Swedish law on building

PBF, Plan- och byggförordningen, the Swedish regulation on building.

QA, quality assurance.

RAÄ, Riksantikvarieämbetet, the National Heritage Board.

SAVE, Survey of Architectural Values in the Environment, it is a method for evaluating buildings and urban structures developed by the Danish Agency for Culture.

SCB, Staistiska Centralbyrån, Statistics Sweden.

SFV, Statens fastighetsverk, the National Property Board of Sweden.

WAF, the World Architecture Festival.

N.B. To distinguish the designed and proposed model for balancing of properties and measures in Phase 2 it is called the working model or designed model. To distinguish the investigated Halland Model in Phase 1 it is spelled with a capital M. To distinguish the proposed methods in Phase 2 from the research methods they are called working methods or supporting methods. This is used throughout the thesis.

The Project – a guide for the reading

The overall objective with this thesis is to design a working model for practical application regarding the balancing of energy and preservation demands, and moreover to design methods of management and collaboration for architects, the conservation professions and engineers who work with built cultural heritage where properties and values are at risk of being neglected.

The risk is new legislation demanding efficient energy use predicated on the documented potential of energy efficiency on both national and international levels, and on the need for decreased greenhouse gas emissions, causing stringent energy requirement even for preservation work on cultural historical buildings. Concerns have been raised, however, as to whether the historical value of our built heritage will be lost in efforts to conserve energy. There is a need for models directed towards the application of an integrated balancing of energy and preservation demands.

The aim is to create a working model and methods that can provide a working environment built on transparency and mutual respect for the different professions and their skills.

The project has a broad approach comprising many different interacting parts. To get an overview of the content a summary of the parts and different chapters is presented here. It may be seen as a guide for the reading.

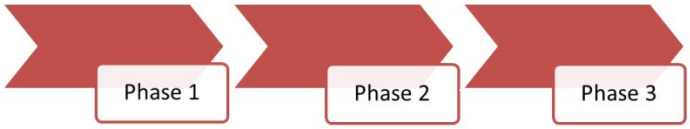


Figure I. The figure shows the three phases of the EEPOCH project of which Phase 1 was concluded with a licentiate thesis and Phase 2 is concluded with this doctoral thesis.

The big picture is that Phase 1 had its starting point in a 'bottom-up' perspective using a case study methodology with five units of analysis. It was mainly about investigating energy efficiency, cultural and historical values and architectural qualities in cultural and historic buildings, and professional management and collaboration in this work on a detailed level moving up to higher levels. The legislative framework was also one unit of analysis. Phase 1 concerned understanding of the context in a practical sense and was reported and discussed in 2011 at a licentiate seminar. The licentiate thesis was a compilation thesis with a framework around three papers.

Phase 2, on the other hand, has a 'top-down' perspective working its way down to a relevant level going through all five units of analysis for a complementary study. It has concerned definitions, the contextual systems, management, paradigms, disciplines, the professions, their methods and collaboration, and a report on the legislation. The results are a working model for balancing energy efficiency, cultural historic values and architectural qualities with supporting methods for the professional collaboration. Four papers have been produced and published during Phase 2 and are partly used in the thesis, but this doctoral thesis concluding Phase 2 is a monograph.

The future Phase 3 will be about implementing the working model and supporting methods presented in this thesis. Step 1 from the model is tested in an on-going 'top-down' inventory of other objects restored within the Halland Model. This work will be presented in a separate report in Swedish and will form the basis for Phase 3.

Introduction

Chapters 1, 2 and 3 describes the programme *Spara och bevara*, the issues currently vital within EU and national contexts regarding energy efficiency and energy consumption, and implications this has on the preservation of historical values in our built environment. These chapters include reviews of other work in the new combined field including studies in the related field of sustainability. Different problematic issues in research and practice are identified, followed by the aims, objectives, expected outcome and delimitations for this thesis.

Summary of Phase 1

Phase 1 was primarily a systematic investigation of heritage buildings, the methods used for the different assessments and the results from earlier restorations. It was also an investigation of the organisation, management and performance of teamwork. The case for the study was the Halland Model carried out during the 1990s and 2000s in the County of Halland, in southern Sweden, where a trading zone was created for restoring about 100 objects at risk and also to educate about 1100 construction workers in traditional techniques.

The contents of chapter 4, 5, 6 and 7 summarise Phase 1. They start with a short summary of the investigated Halland Model followed by a summary of the case study methodology used with multiple units of analysis and all the different research methods. These were applied to three objects and to the professionals, their management and collaboration. Two complementing units of analysis had to be included; laws and regulations, and architectural qualities and functions. Some of the results, the conclusions drawn from the energy calculations, and assessments of the preservation results are described. Experiences from exploring the organisation, management and teamwork, and the conclusions are summarised. The idea was that the preservation work and the experiences, process and methods could form the first part of a foundation for the balancing model and for collaborative methods.

Systems thinking based on linear cause and effect dominated Phase 1, used in combination with systemic thinking when investigating the professional relations in organisation, management and teamwork. In short, systems-thinking is used for reductive generalisations of data for solving complicated tasks while non-linear systemic thinking takes into account peoples' actions and reactions to understand specificity and complexity in processes of human interaction. These thoughts are described in chapter 12 and 16.

Phase 2

Phase 2 mainly concerns investigations of all units of analysis to form a settled framework for the working model and methods. Systems thinking and systemic thinking have been used also in Phase 2 with emphasis on the latter. An overview of the case study, methods and approaches is presented in chapter 8, and chapter 9 is a description of the first three units of analysis. The topics in the new combined field energy efficiency, cultural heritage and its values and architectural qualities as notions and their meanings are defined together with a presentation of some facts and arguments for the benefit and need of all in our built environment.

The fourth unit of analysis, legislation, is presented in chapter 10. Our legislation includes documents concerning both energy and preservation perspectives and some documents that have a direct impact on planning and construction work and management are presented and commented. Chapter 11 consists of an additional analysis of management, teamwork and collaboration to form a basic structure to build on for designing the working model and supporting methods. The unit for

management and teamwork is the key unit for designing the working model together with an understanding of the three professions´disciplines and methods.

Disciplinary conditions, methodology, paradigms and theory in Phase 2 are described in chapter 12 with the main traits of design as conceptualisation and as reflection-in-action. The three professions' knowledge bases, the nomothetic, the ideographic and designerly way of thinking are described and compared. Systems thinking and systemic thinking are also parts of the chapter. Interconnecting theory and practice for use in practice is one aim of this study as a whole.

Next, chapter 13 starts with a summary of three professions and their methods. A comparison of some similarities and dissimilarities is also made, and a foundation for mutual understanding is formulated. The focus is on the similarities, which are the important part when formulating the working model and methods.

Workshops

The contents of chapter 14 are summaries of the nine workshops. They have provided a necessary empirical base and worked as a transdisciplinary arena for discussions on the different issues throughout the project. Both practitioners and academics have participated. One aim of addressing both academia and practice has been to explore how theory can be of use for practice, in practice.

In Workshop I the first object was discussed, and resulted in the inclusion of legislation and architectural qualities in the methodological framework, and Workshop II was about energy efficiency measures. The lecture concerned the requirements for a person performing energy declarations and how an energy declaration then is carried out.

The third workshop comprised different parts within the heritage sector; theory and history; new kinds of assessments; today's practice in Sweden and Italy; laws and regulation concerning preservation and caution with heritage values. In Workshop IV risks assessment and moisture problems when taking energy efficiency actions, and new insulation materials, were discussed.

The themes for Workshop V were the professions, their methods, approaches and philosophical stances, and the balancing of interests. The problem with lack of inventories of built cultural heritage in Sweden was one important topic, as was architectural quality. Discussions on valuation, assessment and weighing of interests; the paradigmatic shift within the heritage sector and on the trading zone were decisive for the development of the project.

In Workshop VI a systemic meeting was carried out with participation from all three professions. The method was used in a new context. A narrative was highlighted from different perspectives and by different professions revealing a variety of interpretations. It pointed out the importance of clear and transparent communication.

Workshop VII, VIII and IX were all focused on presentation and discussion of the proposed model for amendments. Conservation officers, engineers and architects were invited to separate workshops, in contrast to the previous ones where the mix of professions had been an essential condition for fruitful discussions. The aim was to focus on the prioritised issues for each profession.

Results

The working model is presented in chapter 15. The proactive working model for balancing of values and properties is based on the professionals' knowledge and experience and their ability to collaborate. To facilitate the process a framework for the balancing has been created based on mapping, analysis, prioritising and synthesising, which are performed in seven steps using four

documents. It begins with the professionals' individual valuation of the building's qualities, values and performance as a basis for weighing and negotiating to come to a decision about what measures the building can cope with. Information about an on-going top-down inventory conclude chapter 15.

A model will do no better than the quality of methods, discussions and arguments by which it is processed. Therefore the theoretical background and stances used for the methods are also described in chapter 16. The methods needed to support the collaboration when using the working model are linked to an analysis of results and conclusions. The key words are transparency, equality, communication and understanding.

The designed model presented in this thesis is quite simple in its structure and easily comprehended. The supporting methods have sociological and philosophical stances described in international literature available in various languages. The common working process does not vary considerably from one country to another, and the designed model with supporting methods could be used in all kinds of early stages in building processes, and is therefore relevant for use in countries other than Sweden.

The designed model facilitates reflection in the valuation situation, letting the building itself and the professionals' knowledge and skills guide the choice of measures in making responsible decisions. It is intended for use in the early stages of a building project for creating a good working climate that could last throughout the whole process.

Discussion and conclusion

The main results and conclusions in chapter 17 can briefly be described as follows.

This thesis gives suggestions for how to work with the new combined field of energy performance, cultural historic values and architectural qualities in existing built environment. The results are a working model with supporting methods based on the professional's knowledge and skills. It has been developed for use in initial stages in the design process for preservation projects.

As concluded in Phase 1 the different perspectives could converge, meet and be balanced, but the legal requirements cannot. The conclusion is that the requirement is difficult to meet, but the overall target of 20 % CO_2 reduction is possible to meet and also with much more than 20 %. An acknowledgement of renewable energy sources in the regulatory framework concerning energy requirements is suggested, but this issue can only be dealt with and decided on by national politicians.

There is a general imbalance in the regulatory framework prioritising energy issues at the expense of cultural values. One conclusion is that a review of the regulatory framework for a balancing of interests is needed, but this is a matter for national politicians to look into and decide on.

The actual work, the centres and programmes within the new combined field have been developed, but there still is a need for an increased knowledge base and an urge for information also judging by municipal and regional officials. Two conclusions connected are the need for a Swedish guide on assessing architecture corresponding to the ones available for heritage values and energy audits, and furthermore for a handbook connected to the Planning and Building Act and the decree with mandatory provisions, on guidance of how to meet the requirements.

One conclusion is made that combined inventories, of which the first protocol in the working model is an example, would be of great help for buyers of properties and buildings giving a better overview of a building's status and possibilities than single energy declarations can do. It would simultaneously make a small contribution to reduce the stated lack of inventories of built heritage.

INTRODUCTION

1 State of the art

1.1 The research programme *Spara och bevara*

Spara och Bevara, Save and Preserve, is a research and development programme initiated by the Swedish Energy Agency, *Statens Energimyndighet*, to increase expertise in energy efficiency in cultural heritage buildings (Energimyndigheten 2010).

The work for sustainable energy supply in residential and commercial buildings has so far been almost exclusively focused on buildings built in the late 1900s. However, there is untapped energy efficiency potential in the cultural and historical buildings constructed before 1945. The work on energy efficiency in these buildings is neglected.

The limited efforts for energy efficiency are often justified by the risks of distortion and negative effects on the indoor climate and the building. Experiences from earlier energy campaigns show how buildings have been distorted by insensitive measures like adding insulation to façades and replacing windows, but also by interior alterations connected to mechanical systems for heating and ventilation.

The research programme should strengthen and develop national expertise in the new combined field. The potential for energy measures within the field can be achieved by technical solutions as well as by computer technique, architecture and product design. This programme focused on applied R&D as an approach that comprises opportunities within the Heritage sector to develop new knowledge as well as strengthen existing competence for architects, institutions for care of heritage buildings, and environmental and energy technology institutions.

1.1.1 Aim of the programme

The aim of the research programme is to supply knowledge, develop technical solutions and develop methods and techniques that contribute to energy efficiency work in cultural historical buildings without distorting or destroying their values or interiors. National expertise and a cross-disciplinary and available knowledge base shall be created. On a long-term basis conditions for development will be created for rational and cautious management and for commercial services and products directed to national and international markets.

1.1.2 Overall objectives

The overall objective for the research programme is to create a permanent knowledge foundation within the area of energy efficiency in cultural heritage buildings and contribute to long-term, sustainable management of these buildings. The research programme will contribute to build a broad national competence as well as expertise within the new combined field. A genuine multidisciplinary collaboration is necessary to do the research within the scope of the programme in a socially beneficial way. Careful energy efficiency improvement will be achieved through interdisciplinary collaboration where technology meets conservation. The Energy Agency has during the periods 2006-10 and 2011-14 committed 80 million SEK for these two research periods.

Research and development are conducted in four areas within which energy efficiency can be categorised:

1. The building/envelope
2. Supply
3. Use/indoor climate
4. Processes, decision, policy

1.1.3 The EEPOCH project's role within the research programme

The EEPOCH project is one of about twenty projects within the Save and Preserve programme. In Phase 1 the first category mentioned above was addressed studying restored objects combined with the fourth category. Different methods used by conservation officers, engineers and architects were explored together with management and collaboration between the professions with the aim of investigating the possibility of creating a model for balancing interests and values. In Phase 2 the fourth category was addressed focusing on approaches and balancing valuations and development for a working model and supporting methods for assessments and balancing measures and decisions.

The programme is coordinated by the University of Uppsala, Campus Visby, and the Centre for energy efficiency in culturally and historically valuable buildings, *CEK, Centrum för energieffektivisering i kulturhistoriskt värdefulla byggnader*, has been formed. A knowledge database has been set up concerning the field of energy efficiency in cultural heritage buildings. At a doctoral seminar In Uppsala in November 2013 the database and the projects within the programme were discussed and the unanimous assessment of the contents was that technical reports and projects were largely dominant.

In the official magazine of the Institute of Historic Building Conservation, UK, (IHBC 2014) it is claimed that 'Practitioners know that legislation and good practice require special regard to be paid to architectural, historic, aesthetic and social considerations when managing historic buildings, but rarely *how* to strike a balance between the intrinsic value of heritage and the need for greater energy efficiency'.

In this context of research and practice the EEPOCH project is an important complement. A rational model for balancing of energy efficiency measures, intrinsic cultural historical and architectural values and the different interests is needed. A prerequisite for such a model is an understanding of the professions involved, their methods and processes, approaches and disciplinary paradigms, matrix or doxa.

1.2 Current key issues on EU and national levels

1.2.1 Practical stance

Why was this study carried out? All buildings reflect a tradition and a moment or period in history. They speak of past generations' ways of living, and their methods and access to materials. We usually assume that only technically sound structures survived the years, but all buildings need continuous maintenance. We have adopted routines for preserving the built heritage, to build upon and consider the building itself with its intrinsic values. We have also learned that it is possible to add modern conveniences, while still preserving the building's unique properties, using cautious methods. Contemporary conservation is characterized by the concept of sustainability, and integrated conservation is also expected to be sustainable. This is inherent in this tradition, or, as Hawkes (2001) stated, - culture is the fourth pillar of sustainability. The premise is that most buildings must be used for them to be preserved. A prerequisite for this is improved energy efficiency for greater comfort, better indoor climate, and reduced energy costs.

Over ten years ago Edén and Jönsson (2002) wrote 'One important, probably the most important, future problem area is how to improve the environmental performance of existing building stock. Somehow, it still seems that the sector's dominant perception of building is that it is a manufacturing industry, and neglects the special feature of building, the long use phase and the continuous need for maintenance, changed use, refurbishment and renewal.' And further, 'If an even more precise focus is wanted, actions directed towards the existing building stock are the most urgent challenges for both

research and practice. Replace the fundamental perspective from ‘production of building’ to an on-going ‘management’ or ‘stewardship’ of a built environment’. This is fully in line with the idea of preservation, but the fundamental perspective described seems to a certain extent still prevalent.

Stewart Brand (1994) also makes this claim. He emphasises that the time perspective of a building is generally vital not only for its maintenance, but also for its durability and sustainability. Brand advocates a *diachronic view* of architecture, how it has evolved and developed over time. He also holds this view should be used for studying the present in terms of changes over future time, as opposed to the *synchronic view*, of how things are at a specific point in time, ignoring the passage of time, both ‘before’ and ‘after’. It is ultimately a matter of intergenerational equity and the use or misuse of resources. This is as Ruskin wrote in the closing paragraph of ‘The Lamp of Memory’ in 1849 concerning whether to preserve buildings or not, ‘They are not ours. They belong partly to those who built them, and partly to all the generations of mankind who are to follow us’.

1.2.2 Energy consumption

Today on both the national and international levels, energy efficiency measures are considered key actions to sustainability efforts, in response to the issue of global climate change. For Europe in general, energy use in the tertiary sector (residential and service sectors) stands for 40 % of total energy use showed in figure 1.1. Total energy consumption in 2012 in 1000 tonnes of oil equivalent was 1 104 480 in EU-28 (*Eurostat statistics)* which is approximately 12 845 converted to TWh (1 toe = 11,63 MWh). The corresponding figure for Sweden is 377 TWh (*Eurostat statistics*; Energimyndigheten 2013).

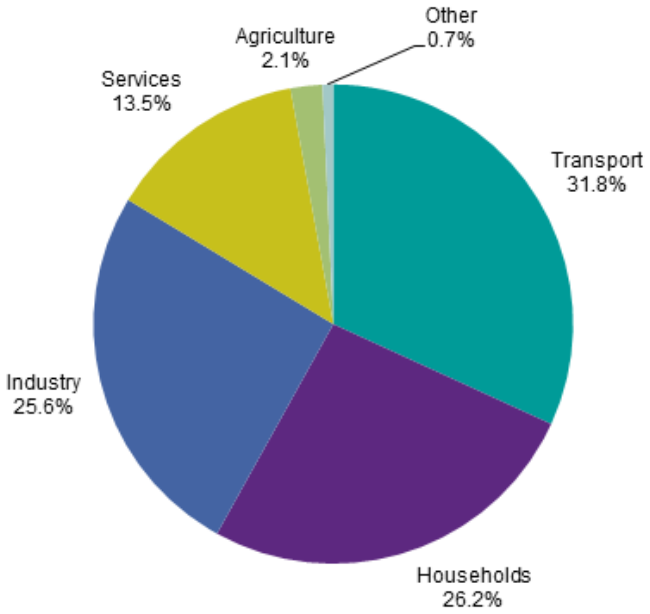


Figure 1.1. Energy consumption, EU-28, 2012. Source: Eurostat (online data code tsdpc320).

Energy consumption is the primary source impacting climate change in Europe. Now the focus has shifted from unilateral support for energy production to addressing consumption as well as supply, emphasising energy efficiency. This involves using energy efficiently at all stages of the energy chain – from transforming energy to distribution and final consumption. EU directives have reflected this focus including Directive 2010/31/EC on the Energy Performance of Buildings, Directive 2006/32/EC on energy end-use efficiency and energy services including a ban on incandescent light

bulbs, now replaced by Directive 2012/27/EU on Energy Efficiency. There is also Directive 2009/28/EC on the Promotion of the Use of Energy from Renewable Sources, which provides for promoting energy efficiency in the context of a binding target for energy from renewable sources accounting for 20 % of total EU energy consumption by 2020. National legislation in Sweden; PBA, the Planning and Building Act, *SFS 2010:900 Plan- och bygglagen*, and *BBR, Boverkets Byggregler BFS 2011:6* i.e., the mandatory regulations, set strict requirements for the existing built environment as well. In Sweden the same requirements apply to the built heritage, for alterations or preservation, as for new construction. What does this imply for our built heritage?

1.2.3 Need for new inventories

Moreover, the limits for the kind of buildings worth preserving have been extended. New inventories make evident that isolated qualified contributions to conservation, concentrated on a few selected monuments, are no longer sufficient. When national funding was made available for inventories in the 1980s, some 3,000 buildings were identified as historically valuable in the county of Halland in southern Sweden. Of the few newer inventories conducted nationally, one was finished in Halland in 2010. This identifies more than 10,400 buildings in Halland's residential and service sector, and industrial and other types (Ahnlund 2008). This is nearly 10 % of the total building stock in Halland with most being neither the high profile 'Outstanding Universal Value' objects identified in the World Heritage Convention nor national monuments. Instead, they represent our common, everyday built environment, and our inherited cultural spaces — symbolic expression of our human life. The inventory is available on the website of the Halland County Administrative Board, *Länsstyrelsen Halland,* and is now also included in the Data Base of Built heritage, *Bebyggelseregistret, BeBR,* of the Swedish National Heritage Board, *RAÄ, Riksantikvarieämbetet*.

Similar results will likely appear in the other Swedish regions if they carry out new inventories. In 2010 there were 7 145 000 buildings in Sweden (SCB 2012). In parts of Sweden there are no inventories or very old inventories on the historic built cultural heritage, which is important to note in this context. This has come to light during workshops and interviews. This lack of inventories is problematic for the heritage sector as a whole. Identifying the valuable built heritage is the very first step and a prerequisite for working with it, and it is also a necessary tool for those handling building permits due to the legal requirements for caution with our built cultural heritage. The first part or step in the working model presented in chapter 14 in this thesis could be a possible way of making these inventories regarding not only historical and cultural values but also energy performance and architectural qualities.

Furthermore, the residential building stock is expanded only one % annually, so in reality we primarily work with rebuilding and alterations of existing structures. At least 90 % of our existing built environment will still be here in 50 years. The greatest potential for energy efficiency lies in the existing building stock. How can the requirement for caution and care for historic values be met in all these buildings that have not yet or not recently been inventoried when they must have maintenance or repairs requiring building permit? Will they be considered for demolition if they cannot meet energy requirements and generate huge costs for running and heating?

1.2.4 Waste management in the EU

Pursuant to Directive 2008/98/EC on waste, Member States are required to establish a waste plan. *From waste management to resource efficiency* is Sweden's Waste Plan 2012–17. Mixed waste from the construction sector, generates the most greenhouse gas emissions in terms of total emissions from production, resource extraction and waste management. The construction and demolition sector generates large quantities of mixed waste, which should be reused and recycled to a greater extent.

The sector generates considerable quantities of hazardous waste. Historically, there have been major deficiencies in the recycling of construction and demolition waste. Construction waste is easier to sort into uncontaminated fractions than demolition waste, as the materials are not assembled in the same way.

Resource efficiency is partly about utilising ecosystem services as best and efficiently as possible so that societal benefits increase without a corresponding increase in environmental impact. The strategic *Waste Hierarchy* in EU Directive 2008/98/EC, Article 4, gives guidance in five steps showed in figure 1.2. The directive states that the waste hierarchy shall apply in prioritizing legislation and policies concerning the prevention and management of waste.

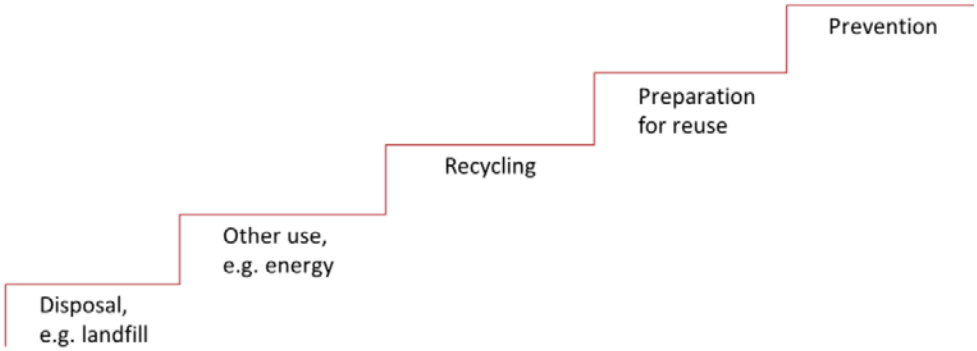


Figure 1.2 The five steps in the waste hierarchy as presented in 'From waste management to resource efficiency' (Naturvårdsverket 2012).

In general, the higher up in the hierarchy, the greater the resource efficiency. The hierarchy first calls for waste to be prevented. If this is not possible, waste must be prepared for reuse, recycling or energy recovery. As a last resort, is disposed of as landfill. Recycling and reuse are important steps on the road to greater and increased resource efficiency and when transferring this concept or thought to the heritage sector, it is easy to conclude that preservation of existing built structures must be regarded as high-quality long-term reuse, promoting the first objective of prevention. This would directly impact the Swedish goal of recovering 70 % by weight non-hazardous construction and demolition waste in 2020.

1.2.5 Embodied energy

Another advantage of using the already built rather than demolition is its relatively low effect on greenhouse gas emissions. A report from the Royal Swedish Academy of Engineering Sciences, *IVA Kungliga Ingenjörsvetenskapsakademien*, and the Swedish Construction Federation, *Sveriges Byggindustrier* (2014), states that the calculated CO_2 emissions from construction processes in Sweden is 10 million tonnes, of which 4 million tonnes are from buildings. The 10 million tonnes are 17 % of Sweden's total CO_2 emissions and equal the emissions from all cars in Sweden. Earlier calculations showed that only 15 % of the CO_2 emissions during a building's lifespan of 50 years emanates from the production of the building, called 'up-streams', and 85% for running and heating, 'down-streams'. IVA's reported project calculations for a housing project show that the production up-streams accounts for 50 % of the total climate impact and thus only 50 % down-stream for running of the building during a period of 50 years. Their calculations speak for preservation of built structures with local materials and labour from both sustainability and climate perspectives. There is energy embodied in existing buildings that must be accounted for. It could be calculated by a detailed life cycle analysis, or LCA.

1.2.6 A way forward

The situation described calls for research and training, interdisciplinarity in academia, as well as transdisciplinary cooperation between academia and practising professionals, and possibly also guidelines for municipal officials handling building permits. Conservation work and work on energy efficiency must be redeveloped in concert with the new conditions. Collaboration is needed to cover the multiple fields, or rather the new combined field, in practice and theory. As Randall Mason (2002) from the Getty Conservation Institute, stated 'No single discipline or method yields a full or sufficient assessment of heritage values; therefore, a combination of methods from a variety of disciplines should be included in any comprehensive assessment of the values of a heritage site'.

Guidelines for energy efficiency in cultural and historical buildings are being developed within the European standardisation. The project CEN/TC 346 Conservation of Cultural heritage WG8, Energy efficiency of historic buildings, *European Committee of Standardisation*, will formulate them and the forecasted voting date for the guidelines is 1st August 2016. The guidelines will consider both historic values and energy efficiency described as a process. The new standard will likely impact all national work within the heritage sector and possibly even legislation. Nevertheless, we need methods for *how* we work with these issues, and eventually also how the new standards can be implemented.

This thesis suggests a working model for the *how*. It is quite easy to make checklists based on linear causalities or describe preferable iterative and rational processes for the work, but because people do not always act rationally in the performance of their work, which is human nature, the checklists and similar are of little help. How to advance when someone puts a spanner in the works due to personal and perhaps irrational positions? How can we create an *understanding* of the different professions´ approaches and methods to make the actual work function satisfactorily?

Sustainability is often defined by four principles: securing the needs of future generations, the responsible use of resources, adjusting that use to nature's ecology, and limiting substances produced by society (Robèrt et al 2012). Another view based on human activities and production defines a number of waste types to reduce, avoid or to prevent (Womack & Jones 1996) in different ways in processing, motion, overproduction, inventory, waiting, transportation and defective end products. We could add to the list the waste making do without using people´s talents, skills, capabilities and ideas, and the wastes of not listening and not speaking (Macomber & Howell 2004).

1.3 Positioning towards sustainable building

1.3.1 Rationality

Rationality is one of the concerns for this thesis. Max Weber (1930) wrote about instrumental rationality (Zweckrationalität) and value rationality (Wertrationalität). The first is a formal and procedural rationality taking rational objectives, means and aims into account, and it dominates the second substantive value rationality, which is using rational objectives and means but whose aims and actions are based on beliefs and values. What is regarded as rational from the first point of view may well be regarded as irrational from the other. A one-sided view on rationality always seems to be problematic. In instrumental rationality, for example, a belief can be developed that efficiency in itself is an improvement regardless of the context. Thus means such as economic growth can be mistaken for an objective, turning formal rationality into irrationality. Formal rationality also tends to reduce individuals to 'cogs in a machine'. Weber envisioned a future of bureaucratic rationalism as a 'mechanised petrification' but also as a 'chaotic inundation of subjective values', a value fragmentation. This was what happened in the 20th century's scientific paradigm, industrialism and

modernism followed by a reaction, the postmodern, post-industrial era and knowledge paradigm, which now has become post-humanistic dominated by economism and consumerism. During these eras a parallel has slowly developed concerned with environmental issues comprising both value rationality and instrumental rationality in combination. Today the paradigm of economism has a strong contemporary parallel in the sustainability paradigm manifested in the strong societal and political focus on climate change. Efforts are also made to combine them, for example by emphasising the viability of a market for green technology.

The sustainability paradigm with its concern for resources and pollution of the earth has come a long way since 1896 when Svante Arrhenius calculated that a doubling of carbon dioxide in the atmosphere would increase the temperature on earth by 5-6°C (Bernes & Holmgren 2007). Sustainability thinking today has permeated all societal fields and retaining a sustainability focus on the intended outcome through a construction project is implicit for architects and engineers and also within the Heritage sector.

1.3.2 Building assessment methods

Miljöbyggnad is a Swedish system for certifying buildings using three indicators: energy, indoor environment and construction materials. It has three levels of rating and is used for new constructions. BREEAM, Building Research Establishment Environmental Assessment Method, is one of the oldest systems introduced 1990 in the UK and has become the most commonly used system today for office and retail buildings. It has ten different indicators and five levels of rating. LEED, Leadership in Energy and Environmental Design, was developed in U. S. It has five indicators and four levels of rating. The system can be used for new constructions as well as existing buildings. All three systems are administrated by the Sweden Green Building Council and partly available on their website. There are more than twenty national systems, schemes, methods or tools worldwide that focus on different areas of environmental performance for building design in different types of projects. Thuvander et al (2012) have made a thorough investigation of the different labelling, guidelines, checklists and assessment tools and they state that few are adapted to handle architectural or cultural historical issues, and none of the more established methods such as BREEAM or LEED, etc. addresses a complexity that balances technical, environmental, economic, architectural, cultural, and social values. Assessment methods have despite this enjoyed considerable success and their widespread awareness has created the critical mass of interest necessary to cement their role in creating positive change (Cole 2005).

Häkkinen and Belloni (2011) have investigated barriers and drivers for sustainable building focusing on a variety of data impacting processes and methodology. They mention that labelling systems like BREEAM and LEED have developed to a marketing tool positively affecting the market value of properties, but they also se possible barriers for a sustainable building process. One is difficulty of adopting new processes and methods. Another is difficulty of defining measurable and quantitatively clear requirements. Other possible barriers are models of cooperation, networking and communication, roles of different actors and management processes. The problem is not lack of information. They state that a number of studies emphasise the importance of the availability of all needed expertise and knowledge in very early stages of projects. Right design options are not considered early enough, and sustainable building requires close interaction and ‘real team working’. They also points out that many small companies are too small to stay competent in the whole range of issues involved. Häkkinen and Belloni know what is missing, and have an idea of what to do, but are still searching for *how* to use or implement the relevant information.

1.3.3 Different views

Other writings and articles on the subject have a broader and independent perspective like Cole (2005) who emphasises "that developing an assessment framework is only a means to an end and not an end in itself". According to Cole there is a variety of systems, methods and tools. At one end of the spectrum are the simpler labelling systems found mainly within or favoured by governments, and the private sector who work with 'sustainable development' from an anthropocentric view without challenging existing powers or privileges, institutional reforms or technological advances. At the other end of the spectrum are complex systems based on a 'biocentric' view that places human presence within a larger natural context, focusing on constraints, fundamental value and behavioural change mainly found or favoured by academics, environmentalists and non-governmental organisations, NGOs working with 'sustainability'.

Cole (2005) also finds that the broad range of perspectives and interests, contradiction and conflict is inevitable. 'In view of the conflicting and divergent sets of values between developers and builders and architects and other designers', he writes the methods "'have to perform a balancing act to engage and win acceptance in both cultures'. He suggests a common language to facilitate and enhance dialogue, communication and storytelling among and between key parties involved in a building project. Moreover this could 'facilitate greater cross-fertilization of knowledge from different disciplines of natural and social sciences'. Referring to Robinson (2004), Cole (2005) states that given the current multiplicity of conflicting views the power of sustainability lies in bringing these contradictions to the surface, and in providing a discursive field in which they can be debated. He also notes that little consideration has been given to process aspects or, to *how* the structure of assessment methods facilitates dialogue.

1.3.4 Turning means to ends

Today there seems to be a trend towards more complex methods and systems. Two gaps in these systems are pointed out by Al Waer and Kirk (2012). The first is how the building provides well being and the second is how assessment systems capture qualitative information. They also propose that methodology and procedures of assessment methods should feature the broad participation of user groups drawn from the public. A relatively early example of this kind of idea is Kaatz et al (2006) who suggest adding user participation based on stakeholder needs into the methods. They emphasise the importance of integration with planning, design and the decision-making process, focused on the building project cycle rather than assessment as a single activity. They have many good suggestions, such as overcoming technical language barriers and focusing on integration, transparency and accessibility, and collaborative learning, but in total they try to add too many functions and processes in the building environmental assessment methods, and ask too much of the stakeholders interests. They have contradictory demands such as flexibility and adaptability in combination with consensus-building and a strong vision of a universal type in which stakeholders must be fostered. It almost becomes dogmatic and turns the instrumental rationality into irrationality.

In a later article, du Plessis and Cole (2011) explore a paradigm shift that acknowledges the world as a complex, dynamic system. It comprises holistic and flexible strategies, engaging multiple stakeholders outside the traditional models for sustainable development. A paradigm can be defined as the shared values, concepts and practices of a community as shaped by the particular view of the world held by that community (Kuhn 2012), and can refer to a scientific paradigm as well as a social paradigm. The shift referred to is the one from a mechanistic, complicated but linear and predictable systems thinking, aimed at equilibrium to a dynamic, complex, non-linear thinking which is unpredictable and process-driven. In social sciences the latter is called systemic thinking, and in

organisational theory the linear is described as first-order cybernetics and second-order cybernetics when taking humans and relations into account. Cole and du Plessis are not only describing social relations, however. Their philosophical enquiry concerns 'the current dysfunctional relationship between humans and the biosphere as indicative of an anthropocentric worldview that sees humans as above or outside of nature, as the source of value, and ascribe only instrumental or use value to nature'. They are referring to Capra (1995) who suggests an '"ecocentric" view, which regard the world as a network of phenomena that are fundamentally interconnected and interdependent'.

This is a dualistic polarised and simplified thought, which is suggested to be 'a necessary requirement for building a unified theory of the built environment' (du Plessis & Cole 2011). As expected they mention a key implication that 'engagement therefore has to happen at all scale of built environment from cities to buildings and materials, and at spheres that include biophysical and social and institutional systems, as well as intangible phenomena such as beliefs, norms and values'. The views du Plessis and Cole refer to can only be acceptable if one understands that as a human one can never 'escape' from the anthropocentric view and the responsibilities accompanying the free will emanating from Kant's first imperative (2002), and that the choice to adopt any worldview, 'ecocentric' or not, religion or beliefs is a matter for each individual human being alone. Otherwise it is only a matter of yet another dogmatic ideology.

We need a sustainable building process in which both predictable systems thinking and unpredictable systemic thinking are combined with individual free thought as well as co-creative social interaction with all kinds of stakeholders. The on-going development of multi-value models, for example at Chalmers University of Technology, could be one answer, but further development of other building assessment methods is another way. The more alternatives and diversity the process has, the better it is. As du Plessis and Cole also state (2011), complex systems cannot be controlled, but they can be designed and redesigned.

1.3.5 Sustainability

When designing or suggesting a model for use in practice, in society, one has to know what society one prefers. Whatever methods chosen or designed they should all in one way or another build upon sustainability. The four basic sustainability principles are: securing the needs of future generations, using resources responsibly, decreasing substances extracted from the Earth's crust and limiting substances produced by society, and adapting those man made substances to nature's ecology. Further principles include decreasing degradation by physical means, and ensuring that people are not subject to conditions that systematically undermine their capacity to meet their needs. This is described in Robèrt et al (2012). These principles form the basis for the Framework for Strategic Sustainable Development, FSSD, and 5LF, the Five Level Framework comprising systems level, success and strategic levels for vision and strategies, and levels for actions and tools. The framework has been developed to help solve problems in complex systems and is designed for problem analysis, decision making, and for planning of programmes and strategic action plans in companies, municipalities and any other organisations. Each level has further laws and principles, and suggestions for questions to ask, steps to take and tools to use.

Taking care of what we have already invested time and money in is more sustainable than erecting new structures from eco-centric, techno-centric and socio-centric concerns. This is well depicted in the Royal Academy of Engineering's print *Engineering for Sustainable Development: Guiding Principles* (2005). Their structure for a holistic approach has three pillars: environmental, social and techno-economic, shown in figure 3.

The Eco-centric concerns natural resources and ecological capacity, the socio-centric concerns human capital and social expectations, the techno-centric concerns techno-economic systems. 'Sustainability can be thought of as the region in the centre of figure 1.3 where all three sets of constraints are satisfied, while sustainable development is the process of moving to that region.'

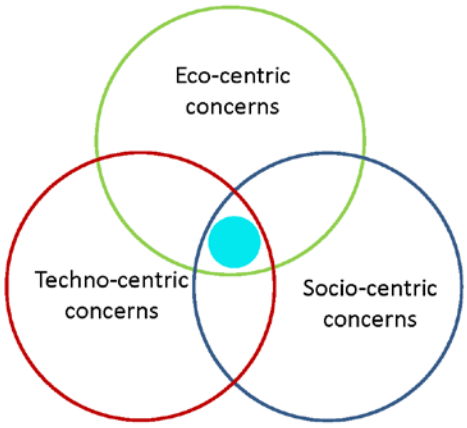


Figure 1.3 The three pillars according to the Royal Academy's Guiding Principles for sustainable development with sustainability marked in the intersection of all three.

The resources we have to deal with are described by the Royal Academy as five capitals.

- Human
- Environmental
- Social
- Financial
- Manufactured

All these capitals are affected in one way or another when buildings are restored or refurbished and must have a design that results in as little negative environmental impact as possible, while being as efficient as possible, with techniques suitable for the purpose and socially suited for human needs.

There are a number of variants of sustainability models and tools to choose from. Each one of them is adjusted to the organisation or the work to be carried out and emphasise one or more of the principles and strategies mentioned or intended for a particular resource management. The two sustainability models described both show a basic view, one for organisational work and one for society and its activities as a whole. Together they comprise both systemic thinking needed for complex situations and systems thinking needed for the complicated. They can be said to represent the basic concepts from which all specialised variants of sustainability models and tools have been developed in different directions.

2 Issues

2.1 Identified issues in the new combined research field

2.1.1 Information search

A literature search conducted on the subject earlier in this study in 2010 showed that, on the whole, there is little scientific literature, books or articles concerning balancing energy efficiency measures with preservation of built cultural heritage and architectural values. This indicates the existence of a knowledge gap in this new combined field. The questions involved here include: Has anyone tried to develop a theory or model similar to the objective of this project? Are there other good examples appropriate for case study, and have any similar studies been performed? The lack of scientific literature found for this new *combined* field confirmed practical experience that no balanced models exist, which is also verified by Thuvander et al (2012). A similar search performed in summer 2014 using the same search protocol at Chalmers library found similar results: numerous works on energy efficiency and nearly as many works on historical buildings, cultural value and preservation. There were still very few works combining all three subjects and their balancing. There are no established theories to use or to verify in this particular new *combined* field. In this light, the current project is designed for theory building for development of applied methods in this field. These searches demonstrated the need for this type of project, reinforcing the determination of its focus.

The research field that applies to the current project has emerged slowly in the last decades and it is a new combined area judging from the two searches which showed that there are very few working in the new area that produce scientific papers. Of the 218 results in 2010 only 10 treated energy efficiency in historic buildings as a new combined subject matter. Most articles were about quite different things, but some were about materials, sustainability matters, strategy and planning, environmental labelling of buildings, measuring with laser scanning, archaeology, the social parts with focus on the users etc. The second search, performed to make a comparison and see any change, gave 869 results but only 12 with relevance for the new combined area where both energy efficiency and built cultural heritage are treated equally and the combination seen as *one* field. Many results were interesting but many were also the same as in the previous search. There were a lot of papers about LEED certification of existing buildings. The environmental certification includes some data about energy, but the aim is not to perform any deeper analysis. So there are still few scientific articles that actually treat the two topics of energy efficiency and built cultural heritage as equivalent and as one field. The lack of relevant material in the databases, though, does not mean that people do not work in the combined field.

2.1.2 Research in the combined field

In a wider perspective some important work has been carried out during the last years. Research within the new combined field of energy efficiency and cultural and historical built heritage has been developed. It spans over natural science, engineering, the Humanities and social science and is in many cases interdisciplinary and transdisciplinary. Some projects concern balancing of risks like moisture damage and additional insulation of buildings or development of new insulation materials (Johansson 2014; Berge 2013), others how to manage sustainable refurbishment (Thuvander & Femenías 2014). All three projects were conducted at Chalmers University of Technology.

Thuvander and Femenías' research concerns the renovation of multi-family buildings from the Folkhem era, 'People's Home 1941-60, which comprises 26 % of the Swedish housing stock (Thuvander et al 2011). Together with a large number of partners and three different built areas as cases they developed the *Rebo* model 'because there was no other model available that could give a

comprehensive description of the housing stock that included not only technical, environmental, and economic qualities, but also social, cultural historical and architectural ones'. They created an arena model to bring together professions who do not usually meet in early stages of a renovation project — a transdisciplinary arena. This solution gave the partners access to expertise they were lacking and facilitated integrated decisions early in the process. A strategy matrix with technology components and value areas was created as part of a method providing checklists and tools as a way of understanding relations. It is described as a multi-value model (Thuvander & Femenías 2014).

A workshop in May 2011 entitled 'Methods and Tools for Decision Making in Renovation', part of the *Rebo* project (Thuvander et al 2012), was aimed at achieving a better understanding of the decision-making procedures in different organisations. 'Gut feelings' based on professional experience was one of the 'methods' used by property owners. Management and operations of properties are to a great extent based on experience. In their conclusion of this workshop they also state that 'there is a need for a better integration of especially the architectural and cultural historical values, and a need to make an inventory of these values early in the process'. The authors also 'see a need for more simplified tools, especially for evaluating architectural, cultural, and social values which are difficult for property managers to handle as they strive to manage various conflicts'. The three case areas planned for renovation had different sets of conditions and needs, and different foci such as social values and user engagement or technical values due to poor technical conditions. The strategy matrix provided support for complex decision making in preliminary studies. The three areas were Hökarängen in Stockholm, and Långängen and Torpa in Gothenburg. The Torpa area in particular illustrated the conflicts among cultural historical and architectural qualities, energy efficiency, technology and health. The Torpa case also demonstrated the need for engagement in the earliest stage. This transdisciplinary project was presented at an EEPOCH Workshop and is summarised in chapter 14.

This year, 2014, a strong research environment for Sustainable Integrated Renovation, SIRen, was established in Sweden. It is attached to the National Centre for Renovation, *Renoveringscentrum* RC, and gathers scientists from natural and social sciences from academic institutions and institutes together with committed industry and public actors. Their focus will be renovation of existing buildings and redevelopment of urban areas conforming to objectives for reduced climate change, altered demographics and democracy in planning. The aim with the last focus is empowering citizens and tenants. SIRen has the overall aim to gather knowledge, to change national practice and to strengthen competitiveness for renovation practice and research, but also to shorten the link between practice, research and policy making.

Some research projects with directed focus on improvement of energy efficiency in cultural and historic buildings have been financed on the European level within the Seventh Framework Programme. Two of them have concerned the development of applicable methods in general and different forms of support for decisions. They are 3ENCULT, Efficient Energy for EU Cultural Heritage finished in 2013 and EFFESUS, Energy Efficiency for EU Historic Districts Sustainability, comprising eight historic city centres ending in 2016. Both projects concern the combined issue of energy efficiency and preserved cultural values.

These six projects are transdisciplinary and/or practice based which seems to be significant for the new combined field. These are only a few of the projects carried out in Sweden or with Swedish participation. There are many more and there are other countries and organisations working in the new combined field.

2.1.3 Work in practice

There are numerous projects concerning the techno-economic part of sustainability, but still very few, in comparison, that actually discuss the combined eco-centric, socio-centric and techno-centric concerns of sustainability applied in our built cultural heritage and including architectural values. One example of how techno-centric systems thinking can occur is the IEE, Intelligent Energy Europe, Project TABULA undertaken 2009-12, (Cyx et al 2011), which presented a typology approach for building stock assessment with the aim of finding general energy saving potentials. Residential building typologies were developed for thirteen European countries. The typologies consist of a classification scheme grouping buildings to their size, age and other parameters for finding general refurbishment measures for saving heating costs.

The European project SECHURBA, Sustainable Energy Communities in Historic Urban Areas, is a consortium of 13 organisations in 7 EU member states that has produced Historic Community Climate Change Strategies to outline best practices and a route map for interventions in culturally sensitive areas. They have worked out a weighing of evaluation factors for use in assessments where economic feasibility and environmental sustainability both have the factor 0.15 and energy efficiency has factor 0.24. Conventions of conservation has factor 0.46. This kind of weighing where qualities in a built environment are transformed into something quantitative implies problems. Awareness of the consequences of this kind of quantification is lacking.

The concept of sustainability thus tends to focus attention on limiting the use of resources, which can result in a kind of negativity. Wood (2006) wants to promote the virtues of a more positive outlook, starting with what has been inherited from the past, how to realise its values, and how to build further on it. For this purpose he has developed an alternative definition of sustainability: 'Improving quality of life consistent with the capacity of supporting infrastructure'. Improving for the better is an on-going action, quality of life emphasises people rather than economy, capacity includes potential in addition to that designed or achieved, and support reminds us that infrastructure is for people. Buildings, cities and other infrastructure are for people who should be at the centre of sustainability, not resources or economics.

The National Property Board of Sweden, *SFV, Statens Fastighetsverk,* manages the nationally owned built environment — about 3000 buildings including approximately 300 historic buildings, our Swedish national monuments. In 2014 they launched a new manual for how to deal with energy issues in historic buildings and a publication with advice and descriptions of possible solutions for how new technique can upgrade cultural and historic property.

The Swedish National Board of Housing, Building and Planning, *Boverket,* launched a new website called the Knowledge Bank, *Kunskapsbanken,* in 2014 that provides guidance to the Planning and Building Act, *Plan och bygglagen SFS 2010:900,* and where the issues of cultural and historic buildings are treated, such as caution and care for historical values and prohibition against distortion of them when alterations of buildings are carried out. The Planning and Building Act comprises both energy and preservation requirements.

Connected to the University of Lund the National Centre for Renovation, *Renoveringscentrum* RC, was established in 2013. The aim is information, to cooperate in projects with industry, identify and initiate and implement new research among other things. The combined issue of preservation of cultural values and energy measures is one of their main areas of interest.

In the engineers Maripuu, Abel, Ekberg and Nilsson's handbook *Totalmetodiken* (2014), a comprehensive methodology is proposed. It was developed within BELOK, a national network for

property owners, initiated and financed by the Swedish Energy Agency. The target groups are clients and building owners or lessees, managers, energy consultants, project consultants, entrepreneurs and operating staff. The book is devoted exclusively to economically viable energy efficiency measures based on practice. It comprises economic calculations and procurement, energy calculations and packages of measures, quality assurance and the different roles throughout the process. The handbook is also a manual for implementation. The method emphasizes continuous monitoring and evaluation and is devoted to the energy issue in any kind of project.

2.2 Identified issues in practice

Who will use the proposed model? The architectural field of today has undergone a big change and we have an altogether different situation within, where the boundaries between research, academy and practice are blurred or even have been wiped away. Big companies have their own research divisions for cooperating/collaborating with different academic disciplines and are creating partnerships with their clients. This was outspoken in the symposium 'The Changing Shape of Practice' held at Chalmers 2013. Five major international companies, and smaller ones, spoke about the knowledge-producing company in which research is a strategic tool in architectural practice, and the common use of knowledge networks. Much of their research seemed to concern materials and techniques in different ways, such as testing products in full-scale projects, and not so much about the human interrelated processes in architectural work. One reason for this may be the possibilities for funding, but all of them invest part of their profit in research — from 10 to 50 % — and they are actively applying for other funding. Their work processes are projective and not prescriptive, but the results must of course be consistent with the financier's requirements and preferences.

The symposium showed how contemporary engineering and architectural firms work with design as a profession in the making. They all talked about their professions as design professions: green design, behaviour design, construction design, technology design, experimental design, process design, material design, and new inventions connected to an interdisciplinary approach, collaborating with other disciplines, but also transdisciplinarity in cooperation between academy and practice. The combinations of engineering, social science, artistic practice and sustainability, are the key elements of their multi-professional teams, using a variety of design methods. This is how our practice looks like today.

The situation for very small companies differs much from this practice. As Häkkinen and Belloni (2011) stated;:many small companies are too small to stay competent in the whole range of issues involved. These companies situated in small towns have to cooperate with other small companies to cover all parts of a construction project, and the collaboration may also include municipalities as their clients. Small towns and municipalities have real estate property and are operating the buildings for the provision of municipal services. Their administrations usually do not have construction managers as employees, and so they engage various local companies. The working model and supporting methods for management and collaboration developed in chapter 15 and 16 could be of great use for these target groups, but the working model could of course also be implemented in bigger established engineering and architectural firms who are already working interdisciplinarily, in combination with their existing methods.

2.2.1 Legislation

During the very first workshop in Phase 1, the question came up about what the legislation actually requires concerning both preservation and energy efficiency. The participants´ experience was that there were too many laws, regulations, mandatory provisions and general advice to get an overview of them all. There were also uncertainties about how the municipal administration considered

building permits regarding historic values and energy efficiency, and thus some interviews were performed with municipal officials. The legislation shows what is actually allowed or possible to implement (perform), so these issues had to become an added unit of analysis in an attempt not to fill this gap but to at least provide an orientation in the somewhat contradictory legislation which was looked into in Phase 2 and is reported in chapter 10.

2.2.2 Assessment of architectural qualities

Another issue was also revealed for the first time during Phase 1 of this project when the cultural and historic values where assessed. The handbook and guide published by the National Heritage Board (Unnerbäck 2002) treated architectural style but not architectural values and qualities. There is a general lack of literature on how the architect works with the existing built environment — on appropriate methods for assessment of architectural qualities and values. Filling this gap is not the aim in this thesis, but some parts of the architects´ work were addressed in Phase 2 together with the other two disciplines, engineering and the conservation professions, and are described in chapters 9, 12 and 13.

2.2.3 Need for increased expertise

In a report made by the Swedish National Heritage Board, *RAÄ, Riksantikvarieämbetet*, in 2010 conservation officers in Swedish County Administration Boards and within the Church of Sweden were interviewed. The concerns were the preservation of historical built heritage in combination with energy efficiency measures, and their knowledge base on the subject. Energy efficiency measures were more common in churches than in regional protected monuments. There was in general an urge to gain more knowledge on the combined subject and there was also awareness that any measures carried out must be balanced. Often the right expertise was lacking ‘in house’ and needed to be purchased.

3 Aims and objectives

3.1 The initial hypothesis and overall aim

The initial hypothesis in Phase 1 of this project was that the contradictory perspectives of preservation of cultural values and energy measures in built heritage could be understood and could converge so that both could be met in applied cases. The means for this was to investigate and analyse objects, the preservation work performed and the good experiences from the Halland Model. Furthermore, the process and collaborative methods used within the restoration work carried out during the 1990s and 2000s. This was done by designing a case study with multiple units of analysis applied to the Halland Model, the work carried out and objects restored. The aim was to answer the initial questions formulated in the licentiate thesis (Norrström 2011):

– Will intangible values in our built cultural heritage be lost in favour of measurable and tangible energy efficiency actions?
– Is there a risk that over-cautiousness about our built cultural heritage may prevent actual efficiency potential from being realised?
– Is it possible to explore this duality, which is the combination of preserved built heritage and energy conservation?
– Can the combination of preservation and energy efficiency actions be performed in a way that both conservation officers and energy counsellors can accept?

The results in the licentiate thesis partly answered the first two questions affirmatively, but also that the different perspectives actually could converge, meet and be balanced. It was also stated that there was a need for models directed towards the application of an integrated balancing of energy and preservation demands. The third question was answered by designing and using the case study with a methodology for mixed methods chosen for multiple units of analysis. The study in Phase 2 has been concentrated to the fourth question using the case study methodology and adding of supplementary descriptions and analyses for designing of the working model and methods for integrated balancing of demands. In research one usually defines a problem to find a solution, but this research question will focus on highlighting similarities and possibilities instead of differences and problems.

The foundation for results and conclusions achieved in Phase 2 consists of the practical-theoretical case study and its results from Phase 1; the outcomes and empirical material from workshops arranged as a transdisciplinary arena inviting both academia and practice, as a basis for an iterative design process; the methods in practice, approaches, theories and concepts used in practice and described in literature with the aim of exploring how theory can be of use for practice, in practice.

3.2 Objectives and aims

The research aims and objectives are two. The first is to design a working model that is application-oriented for an integrated balancing of energy and preservation requirements with the aim of not diminishing the tangible and intangible values in our cultural and historical built heritage. The second is to explore and make a theory-based design for working methods for management and collaboration between the professions involved, with the aim of creating reflection, understanding and transparency and a good working climate in the early stages in working processes.

3.3 Expected outcome

This thesis is a theoretical work based on practical experience where understanding and communication are key issues. Different theories have been studied to gain deeper understanding of

possible ways to advance in practice. The designed working model should be possible to use alone as is, in a well-functioning group or team with extensive experience in the subjects and a good knowledge of each other, but it may also be helpful to have knowledge of a few different ways of thinking, concepts and of methods with respect to the questions above. Furthermore, the early stages, both prior to and as part of the planning of a preservation project:

'…are often decisive in determining the success of a project. In many cases, the prerequisites for a project are decided upon before it is formulated. The early stages are both a creative and a systematic product-definition and design process. The ways in which these initial phases are planned and implemented, those involved and the ways in which they participate are important questions on which relatively little research or writing has yet been done'. (Ryd 2008).

The working model should be developed with a focus on processes for use in the initial and first stage of the planning, in the design process for a preservation or alteration project. The outcome of the initial stage should define two parts: first a programme for preservation of historic and cultural values, architectural qualities, and energy efficiency measures adjusted to individual objects, and second working methods for collaboration adjusted to the individual professions. Both parts should be based on the professionals' knowledge, experience and skills, and should work through the whole preservation project.

3.4 Delimitations

A variety of paths for further research were proposed in the licentiate thesis (Norrström 2011) which concluded Phase 1. One was to investigate more objects from a 'bottom-up' perspective. This time-consuming path was put aside as the investigations in Phase 1 were considered a sufficiently solid foundation for the continuation of the project. A 'top-down' inventory of other restored objects within the Halland Model is on-going, but is not reported in this thesis. This inventory will be reported separately in Swedish.

Another proposition to proceed was research by applying architectural design to selected objects. This has not been carried out. Instead the architect's designerly skills and way of thinking has been used for designing the working model and supporting methods which have been the priority in this thesis.

The use of workshops to form a transdisciplinary arena was proposed also for the continuation. This has been followed, as has the proposed combination of the energy, historic and architectural perspectives when formulating a possible balanced working model. Understanding of these three perspectives and their different cultures was seen as a prerequisite, thus becoming an important part of the thesis. A short visit into history was proposed to give an orientation on the background and the different philosophical stances, historically and in theory of science, and how they affect the construction sector and conservation today. This broad take on the field would, if chosen, constitute the scope for a whole separate thesis. Parts of history and philosophy have been studied, however, to get a better understanding of the three perspectives, professions and their disciplinary cultures. Hermeneutics was proposed as a possible path for the understanding.

A broader investigation of appropriate energy measures by interviewing professionals was proposed, but has not been chosen. Instead the priority has been to concentrate on designing the working model from which appropriate measures will be the outcome when used by skilled professionals. Finally, the proposal to use the lesson learned from the development of the trading zone defined as an active arena for negotiations has been followed. It includes establishing the trading zone early in the planning process. These choices and delimitations were made for making the project manageable.

The main question in this thesis is how a balancing of energy measures, architectural values and preservation in our built cultural and historic heritage could be performed. This question gives rise to supplementary questions. Could one make a weighed assessment? How should the abstract and concrete components, the un-measurable and the measurable, be related to each other in this weighing and balancing? How, and first and foremost: *who* would decide on and weigh these different values and data?

By own experience and that of others, and by arranging workshops for discussions, some answers to these questions became clear. The last question was essential because a great many people have an interest in a building during its lifetime.

3.4.1 The professions in the process

Energy efficiency, cultural historical values and architectural qualities in built cultural and historical heritage were three of the five units investigated in Phase 1 which concluded with the licentiate thesis. That was a case study with a 'bottom-up' perspective. This thesis, Phase 2, is a continuation in which the three topics are supplemented with a wider view, including the professions who make the assessments. Their methods and disciplines are looked into from a 'top-down' perspective. In addition to their knowledge and skills, the professions have a concrete, hands-on interest in the physical building with a direct impact on its properties and values. The three professional groups are: the various engineers working with all of a building's constituent and interacting systems of technical and constructional nature; various architects working with the interior and exterior of the building and its environment, and its materials and functions; all the different conservation consultants and officers working with the building and its environment, and all historical and cultural aspects connected to it in various ways. Starting with this delimitation to make the project manageable, other concepts could be included and other professions may very well begin using the working model once it is thoroughly tested.

The three professions also represent the three cultures that Snow (1964) describes in his 'second look' at the *Two Cultures* first published in 1959. The first culture is natural sciences/technology and the second is the Humanities. Snow also identifies a third culture that is social sciences, including architecture which he calls a social art. All three use results and methods from natural science and are applied sciences — that is, the concern and end for their work is the material world, which for the EEPOCH project concerns the historic built environment.

3.4.2 The valuation situation

The balancing implies a valuation situation. Initially value is attributed something by a valuating subject. In this regard value is a subjective matter even for an analytical philosopher such as von Wright (1993). It was obvious that historically individual parts cannot be weighed in direct figures, but their properties can be assessed - individually. There was a similar answer to the question about formal standards for weighing the individual and particular in buildings. The *way* the individual and particular are assessed can be formal and standardised, which is evident when looking at Unnerbäck's guide (2002) for assessment of cultural and historical values. The individual and particular values and properties can be compared with each other using the guide and in that way to some degree be weighed.

The question about the weighing of different physical data against architectural or cultural historical values must fall back on the question about *who* is weighing. This should preferably be discussed and decided by the professionals in collaboration to illuminate and take into account as many aspects and consequences as possible. The professionals also have the knowledge, skills and experience to

discuss how the abstract and concrete components are, or can be, related to one another in the weighing and balancing. They all have their different practical methods for measuring, assessing and weighing of a building's various components. Together they should be able to make a weighed assessment.

All these answers lead directly or indirectly to the professionals, but do they have routines for how to perform in collaboration? Are their methods compatible or comparable? Collaborative performance does exist in various forms, but no model was found which could provide a firm framework for the sometimes conflicting interests in the collaboration within the new combined area.

Working from different perspectives is, however, maybe not without problems. Assuming that the scientific community includes diverse cultures, with different norms and values, problems can arise if representatives of the different cultures do not understand each other's norms and values. This can complicate the communication. The meeting of different parties´ general cultures is tangible for the practitioner, and for the researcher the meeting between different scientific ideals presents an additional complication. 'Provided that a discussion on perspective is conducted, preferably also on figures of thought or on paradigms, the problem is researchable' (Edén 1987).

SUMMARY OF PHASE 1

4 Summary of the Case Study in Phase 1

The case studied is the Halland Model, a regional project carried out during more than ten years from the early 1990s and on, where about 100 objects of our built heritage were preserved. Those who were engaged in it have predominantly good, or very good, experiences from the different parts of its implementation. The *trading zone* within the Halland Model has been thoroughly researched by Christer Gustafsson and presented in his doctoral thesis (2009), but the energy issue had not been investigated, and not in relation to the preserved cultural heritage values. Sustainability and energy issues were strategic aspects within preservation work in the 1990s. The Halland Model was fairly well documented in archives and therefore suitable for further research.

There were four parts of interest to look into within the Halland Model of which two were chosen. The first two were: the importance of having access to current or updated inventories of built cultural heritage which was a prerequisite for the creation of the *trading zone* as Gustafsson describes it. These two parts were not studied in this thesis. The third and fourth parts are management and collaboration in teams, and the actual results in the preserved buildings. These two parts were the concern for the licentiate thesis.

A project requires a strategy to be implemented, but a strategy is a process that is predetermined before it has begun; it is steered. The original strategy for the EEPOCH project consists of the chosen methodology of a case study, with several methods and approaches involved. Control was necessary since the objectives were formulated before the work actually started. The strategy has been carried out with open tactics allowing modifications in the different parts of the process along the way.

The research design also consists of connecting a reference group, an expert group, and eleven local companies and organisations to the project. Three workshops in Phase 1 and six workshops in Phase 2 have been organised in which the different experts and people from these groups and other invited experts could lecture to give a background to the discussions on the chosen subjects. This worked as a transdisciplinary arena and its outcomes facilitated an iterative design for the model. The workshops were very important in directing this study. Summaries of all workshops from both Phase 1 and Phase 2 are gathered separately in chapter 14. Outcomes decisive for designing the working model and methods are described in brief in chapter 8.

The scheme in figure 4.1 was designed for the research in Phase 1. The scheme outlines the participants and the relation of the different research activities and units of analysis. The case is the core of the study. The project group, expert group and the companies are placed on the top of figure 4.1. The companies and organisations were crucial for creation of the transdisciplinary arena.

The workshops are placed on the next row in figure 4.1. Professionals could meet for discussions and their contribution to Workshop I on setting the research project, to Workshop II on the Energy issue and to Workshop III on the heritage issue in the historic environment sector, were invaluable. This interdisciplinary and transdisciplinary approach rooted the study in approved practice and theory.

The case study is in the centre with the topics arranged around it. Some of them were planned from the beginning and some evolved during workshop 1. Architectural values, actions and effects of proposed actions, and legislation were suggested for additional embedded units of analysis. These suggested topics are grey in figure 4.1, but only architectural values and legislation were actually added. Professionals from the groups were consulted in the research work with all the units of analysis. Facts and results established from the study form the basis for the summary and conclusions in the box to the right.

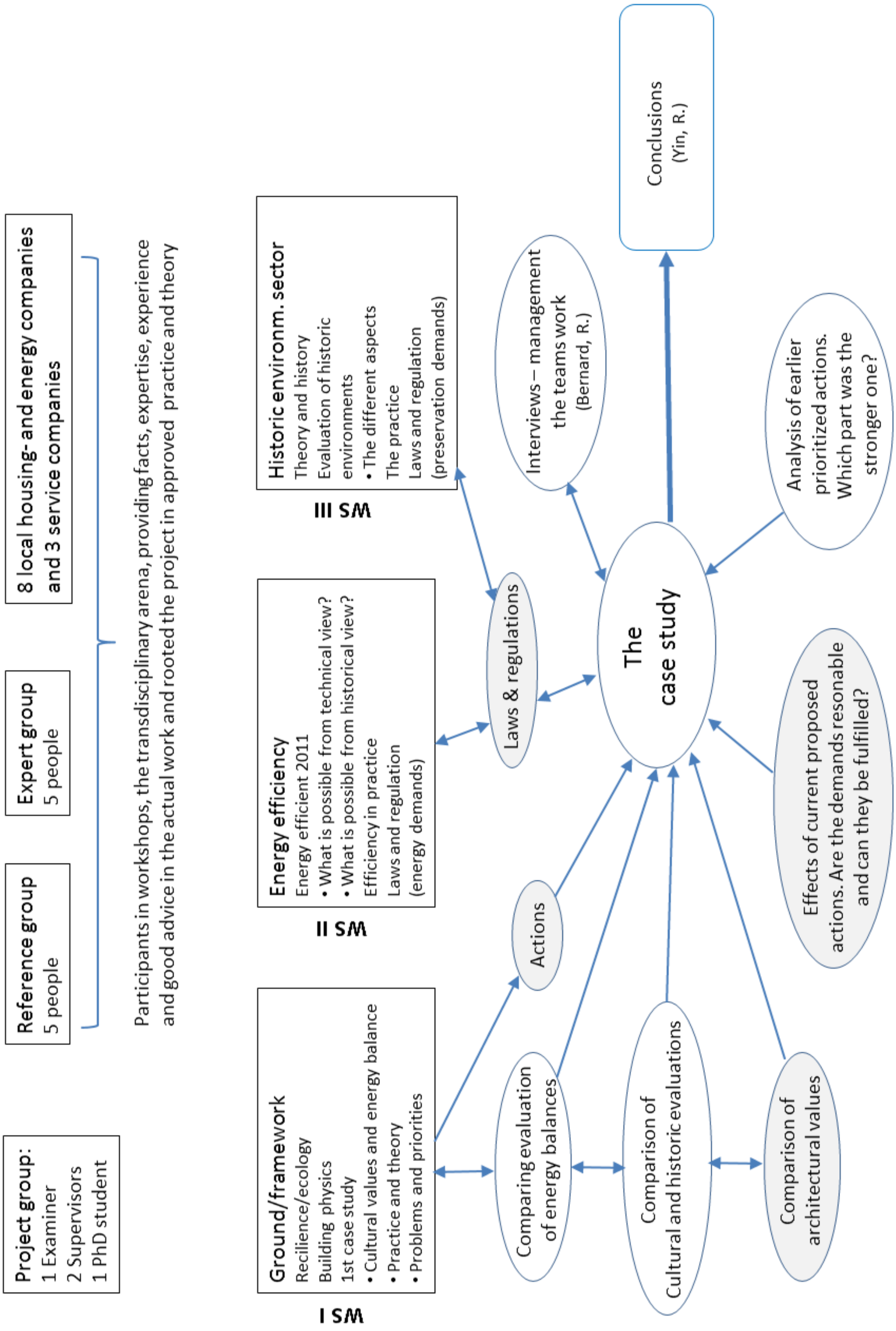


Figure 4.1 Overall scheme on the EEPOCH project, Phase 1, for planning and communication of the research.

5 Methodology and research methods in Phase 1

The overall framework is the case study with multiple units of analysis, in accordance with Yin (2009), in which seven different research methods are grouped for use in investigation of five units of analysis. The first task was to compose an adequate set of units of analysis around the case. The units studied are: 1) Energy efficiency, 2) Cultural and historic values, 3) Architectural values and values for the users, 4) Legislation, and 5) Management and teamwork showed in table 5.1. All five units of analysis have been applied to the objects, assessment methods and the conservation work carried out for use as a basis in the new working model. The three buildings were chosen after screening all of the restored objects and environments in the Halland Model. The aim was to find examples where the energy measures and preserved historic values had been balanced.

Units of analysis	**Main aspects to explore, describe and analyse**	**Methods and base for survey**
1. Energy efficiency	measures approaches accomplishments results	archive studies and search measures *in situ* calculation of energy balances literature studies workshops
2. Cultural and historic values	estimates and assessments approaches accomplishments results	archive studies and search assessments *in situ* literature studies workshops
3. Architectural values and use value	estimates and assessments approaches accomplishments results	archive studies and search assessments *in situ* literature studies workshops
4. Legislation	content and meaning impact of implementation approaches	literature studies interviews workshops
5. Management, teamwork	strategies, methods and processes approaches accomplishments results	archive studies and search literature studies interviews workshops

Table 5.1 Main aspects investigated in Phase 1 and the methods and basis for the survey that were used for each unit of analysis in Phase 1.

Case studies can be used for exploratory, explanatory, and descriptive research, as stated by Robert K. Yin (2009), and hence a framework of a case study was an appropriate choice. The methodology provides a firm yet permissive structure for a mix of methods, approaches, and embedded multiple units of analysis, according to Yin's definitions. There are three principles of data collection to construct validity and reliability of the case study and for convergence of evidence. These are to use multiple sources, to create a case study database, and to maintain a chain of evidence. These principles were followed in the study in Phase 1. Some of the results show similar predicted results, a literal replication, and some show predicted contrasting results for anticipatable reasons, a theoretical replication. In brief it is about using pattern matching and analytical means and synthesizing ability to generalise a set of results to explore a possible hypothesis or broader theory. Triangulation has

been performed when investigating the buildings' energy performance, and in the assessment of cultural and historic values. Assessment of architectural values *in situ* has been performed by one architect, using archival information, an approved guide for assessment, and the architect´s own and other practitioners´ experiences, knowledge, and skills. Management and teamwork and the impact of the legislative framework have, in addition to literary studies, been illuminated by using interviews.

The main approach in the research design has been multidisciplinarity. Interaction with other professions was necessary for a broad study in which a single profession cannot cover the whole field. The professions involved were the conservation professions, engineers and architects. Some represented academia and some work out in practice. Local companies and organisations have also participated: four municipally owned real estate companies and one municipality, three energy and utility companies, and two minor companies in energy counselling and in vocational education, and finally Region Halland and Heritage Halland. Cooperation with other academic disciplines is interdisciplinary and connecting academia and practice is transdisciplinary, and these approaches have rooted the research in both practice and theory. The multidisciplinary, interdisciplinary and transdisciplinary approaches have been the same throughout the study as a whole together with a pragmatic approach. For practical reasons all approaches used in the studies in Phase 1 and 2 are gathered, described and explained in chapter 8.

5.1 Units of analysis and research methods for assessments

5.1.1 Calculations of energy balances

The processes of making assessments of values and energy balances are complicated because the situation consists of a vast number of interacting elements, which makes the work and calculations difficult to perform, although all elements and interactions might be known. A complicated process, however, may be divided and reduced to solvable parts for creating optimized solutions. Based on linear assumptions on how the parts work together, complicated problems can be solved.

The evaluation of energy performance started with archive studies and ocular assessment *in situ* to determine each building´s construction materials and forms, floor area and measuring of all surfaces needed for the calculations. The assessment was carried out in three ways: with IR camera *in situ*, by manual calculations of their energy balances, and by measuring actual energy consumption. The measured and calculated key figures were also compared with key figures for similar buildings by using Boverket's tool for calculations of energy performance on their website.

Differences in these figures can show good maintenance but could also detect problems indicating actions to be taken and showing what can be improved. When preparing the protocol for the manual calculations, eight different books and guides were used (Abel & Elmroth 2008; Adalberth & Wahlström 2008; Adamson & Hidemark 1986; Anderlind & Stadler 2006; Boverket 2009; Elmroth 2009; Peterson 2009; Wärme 1991). A traditional λ-value calculation, showed as equation no.5.1. and 5.2 below, was chosen for the transmission losses through the envelopes, and three engineers were also consulted for guidance, discussion and improvements on the chosen method and control. Heat loss through ventilation was calculated with a simplified rule-of-thumb-method learned from, and used by, practitioners and it is a sufficient method for an architect to use. No calculation model is without flaws, but the strength is in using the exact same procedure in every object for an accurate comparison between them, ensuring the reliability of the case study. All methods are reported in Norrström´s licentiate thesis (2011).

$$R_T = R_{si} + \frac{d_1}{\lambda_{p1}} + \frac{d_2}{\lambda_{p2}} + R_{se} \qquad U = \frac{1}{R_T}$$

(Equations no. 5.1 and 5.2)

λ_p = heat conductivity, practical, W/m ˚C
d = thickness of the materials, m
R = thermal resistance, m^2 ˚C/W
R_{si} = thermal resistance, transition at interior surface
R_{se} = thermal resistance, transition at exterior surface
U = heat transfer coefficient, W/ m^2 ˚C

The buildings' energy performance, how to assess it, and the different associated measures and risks were discussed in workshops, as were risks for mould growth, added insulation, and new materials.

5.1.2 Cultural and historic values

Data for analysis of preserved historic values was collected from the archives of Heritage Halland and the cities. Reports, drawings, documents and photos were analysed as well as information from the evaluation of the physical artefacts *in situ*. Information from people engaged in the conservation work was also documented and analysed. The Swedish National Heritage Board's handbook (Unnerbäck 2002) was used for assessment *in situ* and showed below in table 5.2.

IDENTIFICATION BASIC MOTIVE		PROCESSING REINFORCING / OVERALL MOTIVE		VALUATION BALANCED MOTIVATION
1. Document values (historic properties) • building history value • historical building technology value • patina • architectural historic value • societal historic value • historical social value • historical personage value • techno-historic Value	2.Experience values (aesthetically and socially engaging properties) • architectonic value • artistic value • patina • value for surrounding environment • identity value • continuity value • value of tradition • symbolic value	• Quality • Authenticity, genuineness • Pedagogical value, legibility	• Rareness • Representativeness (national, regional, local)	• MAIN MOTIVE (the dominant basic motive) • ADDITIONAL BASIC MOTIVE • REINFORCING/ OVERALL MOTIVE

Table 5.2 Translation of the checklist for evaluation in the National Heritage Board's Handbook 'Kulturhistorisk värdering av bebyggelse' by Unnerbäck (2002), for assessment of cultural and historical values.

Basic and enhanced motives for preservation and the other subcategorised values were defined and processed with the reinforced and overall motives. The inventory *in situ* was registered by the investigator and a conservation officer individually on separate occasions and the data was used for a comparison with earlier inventories for a thorough triangulation. This was also an appropriate way to enhance the construct validity by using multiple sources of evidence, according to Yin (2009).

Cultural and historic values were also discussed in workshops in relation to the energy issue, and possible measures for energy efficiency. Workshop III had risks and opportunities in the heritage sector and new strategies as a special theme, and *RAÄ*, the National Heritage Board, demonstrated a new model for assessing historic values at this workshop. The theme for one workshop was the buildings' properties, values, and measures and how different professions assess and experience them.

5.1.3 Architectural values and use values

Assessment of architecture, or our built heritage, is mainly a matter of seeing what is legible and interpretating it, similar to hermeneutic methods. A method for executing the assessment was expected to be found in the National Heritage Board's handbook, but the content was predominantly based on styles, and hence not sufficient from an architect's point of view. There is no Swedish handbook or guide on how to make an overall assessment of *architectural* qualities or values. The solution, determined after consulting a professor in the theory of architectural history, was to use the Commission for Architecture and the Built Environment's, CABE´s *Design Review* (2006). It is a tried and tested method of promoting good design and the criteria for qualities, site planning and for urban design and architecture are listed in table 5.3, 5.4, 5.5 and 5.6. The *Design Review* is also used when assessing and judging all entries to the World Architecture Festival, WAF. The guidance delineated by CABE was used to avoid a subjective selection of aspects. Usually there are a number of different design approaches, which work in response to a given set of circumstances when designing for a new site. All these concepts and approaches can be of use also when analysing an existing building, its use and organisation of reality, and its context. This study concerned existing buildings, but the *Design Review* also applies in these cases. Architectural qualities are signs of value as well as physical properties, and when they are considered to be good they are desirable in planned as well as in existing buildings. Only the most basic and common aspects were addressed when the assessments were performed *in situ* using the CABE *Design Review* as a guide in this study. The result was compared with archive studies and photos of the building. The need for assessment of architectural values came up at the first workshop. It was not planned for or prepared for from the beginning, but was added as a unit of analysis.

Aspects of architecture	
Commodity	
Firmness	
Delight	
Clarity of organisation, from site planning to building planning	
Order	
Expression and representation	
Appropriateness of architectural ambition	
Architectural language	
Scale	
Conformity and contrast	
Orientation, prospect and aspect	
Detailing and materials	
Structure, environmental services and energy use	
Flexibility and adaptability	
Sustainability	– economically
	– environmentally
	– socially
Inclusive design	
Aesthetics	

Table 5.3 Aspects, qualities and values that make a good project according to CABE's Design Review pp. 14-15.

Movement hierarchy	– people first, cars second
Parking provision	– is it well planned and convenient to use, for pedestrians as well as drivers?
Service access	– is it carefully considered so that it does not cause conflict with other functions and is not visually intrusive? – have refuse storage and collection been dealt with satisfactorily?
Control of vehicle movements	– and service provisions so that they do not cause inconvenience
Sustainable development	– these principals should be integrated into the masterplan as well as individual buildings
Boundary treatment	– does the project occupy the site in a way which makes sense in relation to neighbouring sites? Relationships with the differing site boundary conditions and with adjoining sites
Variety	– design of individual building, by different architects, responding to changes in needs, uses and technologies
Orientation	– does the layout take account of solar orientation so that internal and external spaces benefit? (e.g. daylight reaching into the buildings)
Landscape design	– does the landscape design make sense as a response to the nature of the site and its context? Is it recognised as an integral part?

Table 5.4 Aspects of site planning to consider as per CABE's Design Review pp. 12-13.

Character	– a place with its own identity
Continuity and enclosure	– a place where public and private spaces are clearly distinguished
Quality of the public realm	– a place with attractive and successful outdoor areas (that is, areas which are valued by people who use them or pass through them)
Ease of movement	– a place that is easy to get to and move through
Legibility	– a place that has a clear image and is easy to understand
Adaptability	– a place that can change easily
Diversity	– a place with variety and choice

Table 5.5 Suggested objectives of urban design as per CABE's Design Review p. 11.

Urban structure	– the framework of routes and spaces
Urban grain	– the pattern of blocks, plots and buildings
Landscape	– shape, form, ecology and natural features
Density and mix	– the amount of development and the range of uses
Scale	– height and massing
Appearance	– details and material

Table 5.6 Suggested aspects of form to be considered when carrying out an urban design analysis according to CABE's Design Review p.10..

5.1.4 Legislation

The methods for understanding the legislative framework were mainly reading and analysing it, but to know how the requirements for energy use and caution of cultural values were implemented in the municipalities, contact with municipal officials, who work with planning and handling building permits, was necessary. The aim was to find out how municipal officials interpret and use the laws, regulations, and mandatory provisions in their everyday practice. Proper but simple and semi-structured interviews were carried out in the tradition of social science, using Bernard's guide (2006) for support. One civil servant and five municipal officials were addressed. The work included three meetings and three phone interviews during which short notes were taken and then transcribed. The questions concerned which legal documents they were actually using and how they were interpreted for use in building permits concerning reconstruction, other cautious alteration and extension. The mandatory legislation was also theoretically implemented in the three chosen buildings and a comparison was made including the comparison of other existing buildings of the same type, age, function, and use, details of which are available in Boverket's database on their website.

The laws and regulations, and their impact when implemented, were discussed from the first workshop and had to become a unit of analysis, which was not planned from the beginning. The issue of law and regulation was discussed when it was revealed that a new major refurbishment was planned for Fattighuset, and the legislative issue has arisen regularly in almost every discussion and workshop during Phase 1.

5.1.5 Management and teamwork

In Gustafssons's dissertation on the Halland Model (2009), an application-oriented theoretical platform and a new model, providing adequate approaches to solve boundary-spanning challenges, is defined. The team organisation and management has been explored in the EEPOCH project using qualitative methods. Interviews with six informants were performed in Phase 1 and one interview in Phase 2. Four were recorded in written notes and three were recorded as audio files and transcribed. Frost (2009) mentions the importance of using reflexive awareness to reveal the influence of the author's presence and intervention on the informant. The first interview was carried out as an unstructured one in which the informant could speak freely without much interruption. It was sound recorded and notes were taken. This method gave a very wide picture and this interview formed the basis for the other interviews. These could be more structured and much shorter, verifying facts from the first interview but also adding some perspectives. Literature studies of traditional methods described by Bernard (2006) were used for transcript analysis and interpretation together with three books on leadership, management and teamwork (Larson & Kallenberg 2006; Malthén 1998; Larsen 2003).

5.2 Comments and conclusions from using the research methods

5.2.1 Comments on calculated and measured energy demand

When comparing the calculated key figures with the measured ones, some assumptions can be made. The difference between Fattighuset's calculated and measured figures depends mainly on air leakage through the openings in the envelope — windows and doors that are not airtight, and the air vents causing a cold draught which has to be countered by increased heat supply. This was not taken into account in the calculations. Furthermore, the photos taken with an IR camera, together with the calculated equation on moisture and condensation at the dew point in the construction, indicate that there are risks for condensation and mould growth at thermal bridges. This equation no. 5.3 derived from WÜFI only applies for solid walls and was learned from Hoppe (2009) at Technische Universität München, TUM. The f factor is always between zero and one, $0 < f < 1$. To avoid the risk of mould the value of this factor f must be at least 0.7 at the most unfavourable point, which is often where the thermal bridge is. To calculate the f factor three temperatures must be known: the internal surface temperature Θ_{si}, the outdoor temperature Θ_e and the indoor temperature Θ_i

$$f = \frac{\Theta_{si} - \Theta_e}{\Theta_i - \Theta_e}$$

(Equation no. 5.3)

In table 5.7 below, the low measured figures in Teatern, compared with the calculated ones, are due to the ventilation system with supply air and exhaust air, with heat recovery, in combination with the flexible and energy efficient installations adjustable to the activities and the use of the premises. The efficiency and automatic adjustability of the system was not foreseen and not included in the calculations. The automatic and adjustable control and regulation system in Tyreshill is the most plausible explanation for the divergent figures on measured and calculated energy use. When the two woodstoves are in use the automatic temperature regulation decreases the supply of heat from the main distribution system, and the extra heat from the woodstoves is not included in the calculation.

Buildings	Measured key figures for energy use kWh per m_2 A_{temp} year	Calculated key figures for energy use kWh per m_2 A_{temp}
Fattighuset	204	191
Teatern	122	146
Tyrehill	157	174

Table 5.7 Comparison of measured and calculated key figures for the three buildings.

In general the conclusion is that mapping and calculating a building´s energy systems and energy use and how all parts interact and impact one another in a building, and the risks that it entails, is more time consuming than the other assessments. There are also more assumptions involved, which in itself may be due to the fact that these are older, existing buildings, where documentation often is missing.

One conclusion about a building's energy performance is that it can be described by the measured energy use and a key figure because this does not differ much from a calculated energy balance, at least concerning the objects in this study. This suggests that a common energy declaration can be enough for a professional to get a good picture of a building's energy performance. This also indicates that the energy requirements expressed as a key figure in *BBR, BFS 2011:6,* the mandatory provisions for building permits in Sweden, are sufficiently well expressed and enough to get a good view of a building's energy performance for a professional.

5.2.2 Comments and conclusions about cultural and historic values

The triangulation of cultural and historic values was made and when comparing the registered values, aspects and properties, the consistency was great. When using the NHB's handbook by Unnerbäck (2002) it turned out to be a good tool used as a checklist and a help for finding the relevant values to assess in a building. There are good descriptions with examples of motives and values. Even if architectural style is one of the properties described in the guide, the architectural qualities and values are missing, which was a problem but one that could be solved. Nevertheless, the handbook describes a good method and is a reliable tool.

As a checklist the handbook must be complemented with a descriptive document and photos. The assessment was a quite straightforward process, increasing the knowledge about the object step by step, but it was also easy to get lost in details when trying to solve the puzzle. The assessment was less time-consuming, though, than assessing the objects´ energy performance.

One conclusion is that the handbook can be used both for deeper studies of built heritage and for a quick assessment that is complete enough and expressed well enough to give a professional a good view of a building´s cultural and historic values.

5.2.3 Comments and conclusions about architectural values and use values

The *Design Review* (2006) was a good tool used as a checklist and an aid for finding the relevant qualities and values but had to be complemented with descriptive documents and photos and layouts. This concerned a familiar subject and the assessment was also less time-consuming than assessing the objects´ energy performance.

The same conclusion, as above, is that the *Design Review* can be used both for deeper studies of built heritage and for a quick assessment that is complete enough and expressed well enough to give a professional a good view of a building´s architectural qualities and properties.

Assessments of architectural qualities showed a somewhat wider or broader picture of the objects so the *Design Review* turned out to be very useful. There is a need for a similar Swedish guide. As professional architects often develop and design their own methods, a guide may be useful for a more standardised assessment for use when there are many objects to assess, engaging many professionals and particularly if there are different architects that make these assessments.

5.2.4 Comments and conclusions about legislation

When reading the law *PBL, 2010:900,* Planning and building Act, regulation *PBF, 2011:338,* Planning and Building Regulations, and the *BBR, BFS 2011:6* national mandatory provisions concerning energy efficiency and cautiousness of cultural values they seemed somewhat contradictory. The same energy requirements apply to existing buildings that are to be altered or refurbished and to new constructions. Energy use may exceed the requirement by 20 % if, for example, there are special historic values to protect. Table 5.8 below clearly shows that the requirements were not met, except for the Teatern, thus justifying the concerns that heritage values would be lost if the building were refurbished to meet the requirements.

Buildings	Key figures for energy use kWh per m^2 A_{temp}, year	Boverket's type code 826 statistic interval	Energy requirements BBR section 9:2a and 9:3a	Requirements BBR 9:2a and 9:3a exceeded by 20%
Fattighuset	204	144–200	100	120
Teatern	122	123–185	100	120
Tyreshill	157	170–208	110	132

Table 5.8 Measured key figures, kWh per m^2 A_{temp} and year, for the three buildings and interval taken from Boverket's database for existing buildings of the type, age, and use. Requirements for residential and commercial buildings in BBR (BFS 2008:20), section 9:2a for residential and 9:3a for commercial. For comparison the figures for exceeding the requirements by 20 % are included. These were the requirements in 2010 for buildings with heating other than electric heaters.

According to the interviews, the general opinion was that there were too many legal documents and that some documents were not used at all. The general recommendations concerning built heritage did not come into use in practice. This was mainly because they were not mandatory and did not apply in a legal context, and hence there was no point in referring to them in case there should be a legal dispute. Using interviews was the only way to understand how the legislation was actually used by the municipal officials. In the municipalities there was a desire for clearer and simpler legislation.

5.2.5 Comments and conclusions about management and teamwork

The transcription of the sound recorded interviews was very time consuming, but was in some cases a preferable method to written notes as when there were many specific facts and details that were important for the narrative and its interpretation. The reading of literature about leadership, management and teamwork (Larsen 2003; Larsson & Kallenberg 2006; Maltén 1998) was about understanding and interpretation, by making analogies between the text in the books and the transcriptions. This is made in relation to meanings and the reader´s understanding of them. It was a matter of comparing facts from the different interviews and a pattern matching for an analysis. This revealed the roles, methods and organisation. This interpretative, hermeneutic approach was an inductive attempt to generate a hypothesis. The interviews were analysed in a discourse in which energy counsellors are usually considered insensitive and conservation officers are usually considered conservative, and the analysis focused on management and leadership as ways of mediating between the different cultures.

5.2.6 Overall conclusions and comments

As the knowledge within one single discipline was not sufficient for creating an overview and deeper understanding of the chosen and new combined topic, it demanded different kinds of tools and practices — hence the design of workshops. Literature has been explored, in search of tools and methods that could work in practice in Phase 1. The case study as a whole was a very good methodology for creating the necessary strong framework for organising the different topics and the different methods systematically, following the protocols.

From a comparison of the three profession´s assessment methods some conclusions can be drawn. The most significant is that there are many different methods and software programmes for engineers and for architects, but not so many for conservation officers or consultants. It is the conservators that use special software within the heritage sector. For the energy field and for architecture there are many established methods, making them in a way more accessible and easier to understand since there are many entrances into the topics. A disadvantage from an architectural point of view, however, is the lack of hands-on-guides. Another revealing fact, showing that first impressions last, was that the conclusions drawn from a first quick assessment remained valid even after a deeper investigation and assessment showing the reliability of both the tools used and the professional abilities for analysis.

6 Assessment of values, performances and qualities in Phase 1

The subject for this research project has been the built environment from the epoch of traditional craftsmanship and constructed before 1945. The three buildings chosen for the study were Fattighuset, Teatern, and Tyreshill. The results of the energy calculations and assessment of historic and architectural values are presented below as short summaries and table 6.1 below gives a good overview of the main results.

Object	Energy use	CO_2 emissions	Cultural and historic values
Fattighuset	216 MWh/year	16.74 tons/year	Best preserved
Teatern	108 MWh/year	20.53 tons/year	Well preserved
Tyreshill	37 MWh/year	—	Moderately preserved

Table 6.1 shows an overview of two units of analysis and CO_2 emissions connected to the energy use.

6.1 Fattighuset

Fattighuset, Drottning Kristina 2, Halmstad is the best-preserved building, but has the highest energy use. It was built in stages; in 1859 and 1879, and the back wing in 1891 and in 1901. Drawings for this were made by Hans Strömberg and Sven Gratz, two architects from Gothenburg.

Fattighuset has mainly been used by the fire brigade. Its two buildings have a solid red 1 ½-wythe brick construction, and partitions and floors are wood-framed. The buildings are made of local materials, worked by skilled craftsmen. They have well-preserved original forms, expressive exteriors, and preserved interior furnishing. Most of the old doors, windows, stairs, floors, and cornices have preserved original features. The almost intact floor plans have a general character, which enables different activities to take place within them, and as such possesses high architectural quality. The buildings, and especially the back wing, have great authenticity and patina. Fattighuset has classification 1 in the city´s preservation plan; a building of great cultural and historic value with an exterior that may not be altered.

The new mechanical continuous exhaust ventilation is placed in a separate room in the attic and the ducts are visible in the corridors. Fresh air is supplied through vents in the brick wall. The tenants experience poor comfort levels. It is cold during winter, especially in areas near the fresh air vents and around windows and doors. On the interior walls, by the fresh-air vents, the temperature was measured at 9°C, when the outdoor temperature was 0°C. In the oldest part of the building, on the ground floor, there is a boiler room where the exchanger for district heating is situated. There is also a problem with the foundation. Fungus growth in the stone foundation occurred in the beginning of 2001. The foundation was then excavated and a dehumidifier with continuous measuring of humidity and control was installed. When the conservation was carried out, the earlier roof garrets were replaced with roof windows, and 175 mm of insulation was added to the interior side of the roof. Nevertheless, during the summer the offices on the attic floor become overheated. The conservation work was carried out in 1996. After its completion, Fattighuset was let out to shopkeepers and offices.

The measured energy consumption for heat and electricity is 216 MWh/year. Total area A_{temp} amounts to 1,062 m^2. The definition for A_{temp} is the area heated to +10°C or more. The key figure for energy consumption is 204 kWh/m^2 per year. This is considered high for an old building in this category, type code 826, according to the comparative key figure given, statistic interval 144–200 kWh/ m^2 per year, when calculating the energy performance of the building at Boverket's web site. Fattighuset is

heated by district heating and the CO_2 emissions calculated are 16.74 tons/year. The photos 6.1, 6.2 and 6.3 below show the building´s expressive brick façade, the windows and the hose tower, once used for drying the fire brigade's hoses after use. The results from the conservation work are considered good, with well-preserved authenticity and patina, but, in short, preservation issues in Fattighuset have been given foremost priority, at the expense of indoor comfort and energy issues.

6.1

Photo 6.1 by Eva Gustafsson, Heritage Halland at the Regional Museum Halland. Fattighuset. North façade facing Lilla Torg in Halmstad.

6.2

6.3

Photo 6.2 by Heidi Norrström. The second-rate quality bricks make the façade very expressive. Photo 6.3 by Maja Lindman, Heritage Halland at the Regional Museum Halland. The original window and niche mediating the daylight as it enters the room.

6.2 Teatern

Teatern, Laxen 5–8, Laholm, is a well-preserved building with a reasonable energy use. It was built in 1913 with drawings by Per Lennart Håkansson, and was refurbished in the 1950s. Teatern is the local theatre. It has a solid 2 ½-wythe brick construction with a stuccoed façade. Partitions and floors

are wood-framed, except for the auditorium's added inner roof structure of steel. In Teatern the original interior of the foyer, the auditorium, and the public restroom for refreshments and use between acts were restored to their former state with lime plaster and gold leaf. The stuccoed façade was altered in the 1950s, but was not restored during the conservation work in 1995. Still, Teatern is one of the most dominant buildings at Hästtorget in the old town, Gamleby, and has classification 1 in the city´s preservation plan as a building of great cultural and historic value.

Teatern was restored in 1995 within the Halland Model. During the conservation work, 300 mm insulation was added to the inner vaulted steel roof over the auditorium, and ventilation with both exhaust/supply air and a heat exchanger for heat recovery was installed. The vaulted windows in the auditorium were reproduced and partly fitted with triple glazing. These were the main energy efficiency actions carried out in Teatern. The measured energy consumption for heat and electricity is 108 MWh/year and per area A_{temp}. The area heated to 10°C or more, $A_{temp,}$ for Teatern is 884 m^2. The key figure for energy consumption is 122 kWh/m^2 per year. This is considered low for an old building in this category, type code 826, according to the comparative key figure given, statistic interval 123–185 kWh/m^2 per year, when calculating the energy performance of the building with a tool for calculation at Boverket's web-site. Teatern is heated by a gas boiler and the calculated CO_2 emissions are 20.53 tons/year.

The authenticity in the building's appearance is high as showed in photo 6.4, 6.5 and 6.6 although it lacks some of the patina of 1913, mostly due to the 1950s refurbishment, as seen in the building´s façade in photos below. The energy efficiency measures have been nicely adapted to the building and are not experienced as disturbing.

6.4

Photo 6.4 by Heidi Norrström. The South façade of Teatern, facing Hästtorget in Laholm.

6.5


6.6

Photo 6.5 by Heidi Norrström. The entrance door of the theatre seen from Hästtorget in Laholm. Photo 6.6 by Eva Gustafsson, Heritage Halland at the Regional Museum Halland. The stairs in Teatern leading up to the foyer of the theatre in Laholm.

6.3 Tyreshill

Tyreshill, Rydö 3:20, Rydöbruk, Hylte, is the least preserved building, with energy use that is a little too high, considering the energy measures carried out. It was constructed in 1907, and was both designed and built by a local builder. Tyreshill has a solid timber construction and was planned as a private house for three families, but was remodelled in 1949 for five families. According to the local preservation plan, it is the oldest house in the industrial community Rydö Bruk. Tyreshill has a typical red wood façade with white trim, and it was quite dilapidated in the 1990s. The owner at that time wanted it to be demolished, but the building committee did not allow it. It was renovated in 1997–98 and most of the exterior façade is intact, despite the otherwise poor condition and showed in photo 6.7 and 6.8. The interior was totally refurbished and even parts of the construction on the ground floor had to be reproduced. The construction details of the interior woodwork had to be produced by working from old models. The attic was insulated with 200 mm mineral wool during the restoration, and 45 mm was added to the interior side of the walls. Low-emissivity glass was selected for the inner panes of the windows. Two wood stoves were installed, one on each floor, using the original chimneys, along with a boiler for wood-pellets with storage in a shed on the property with a culvert into the house. The building has radiant floor heating and natural ventilation. Today one family lives on the first floor and they have a workshop and a ceramic studio on the ground floor.

The measured energy consumption for heat and electricity is 37 MWh/year and the area heated to 10°C or more, A_{temp}, is 235 m^2. The key figure for energy consumption is 157 kWh/m^2 per year. This is considered low for an old building in this category, type code 826, according to the comparative key figure given, statistic interval 170–208 kWh/m^2 per year, when calculating the energy performance of the building with a tool for calculation at Boverket's web site. Tyreshill is heated by a boiler for wood-pellets with a storage tank for heated water, and therefore causes no CO_2 emissions.

The result of the restoration is a very comfortable building that is warm, with no draughts. It has a modern kitchen, bathrooms, space for laundry, and all the facilities needed in a household of today. Its appearance is original but lacks all patina in the interior. Its cultural value is considered moderate but Tyreshill has high value in its context, visibly exposed and located on the hillside as shown in

photos below, and as part of the young community's history. Utility, comfort, and energy issues were prioritised at the expense of the original authenticity and patina, due to its poor original condition.

6.7

Photo 6.7 by Eva Gustafsson, Heritage Halland at the Regional Museum Halland. Tyreshill's façade, towards Southeast.

6.8

Photo 6.8 by Heidi Norrström. The Southwest façade of Tyreshill seen from the upper level of the garden.

6.4 Summary of conclusions

Fattighuset: The tenants experienced poor comfort levels. It was cold during winter in areas around windows and doors. The attic floor was overheated during summer. There was a problem with fungus growth in the foundation. A dehumidifier was installed in 2001. The results from the conservation work were considered to be very good with well-preserved authenticity and patina. In short, preservation issues in Fattighuset have been given foremost priority at the expense of indoor comfort and energy issues.

Teatern: In Teatern the original foyer, auditorium, and restroom were restored to their former grandeur. The ceiling was uncovered. All plastic-based paint was removed from the walls, and the damaged parts were restored with traditional paint. The authenticity in the building's appearance is high although it lacks some of the patina of 1913 mostly due to the 1950s refurbishment. The energy efficiency measures have been nicely adapted to the building and are not experienced as disturbing the interior spaces.

Tyreshill: The completion of the restoration shows a very comfortable house that is warm, with no draughts. It has all the facilities needed for a household of today. The appearance and façades are original but there is no patina in the interior due to the total interior refurbishment. The cultural value is considered moderate, but Tyreshill has high value in its context as a part of the young community's history. Utility, comfort, and energy issues were prioritised at the expense of the original authenticity and patina as a consequence of its poor original condition.

6.5 Overall conclusions from the assessments

In an ideal situation all planned maintenance, alteration, and conservation should be based on thorough inventories of the object and its status as well as the users' need for a good indoor environment. One conclusion is that it is possible to make a balanced assessment of the different requirements and make a balanced performance of measures. In the 1990s restoration work was ambitious about the preservation of values, and this is reflected in one of the buildings studied, Fattighuset in Halmstad, where it seems that the preservation of cultural value had been given much greater weight than issues of energy efficiency and good indoor climate. A result of that was low utility and difficulties in letting the building. The balanced example with a high level of preservation is Teatern in Laholm where the energy efficiency measures taken were performed with respect for cultural value and the energy use is low in relative terms. In the third building, Tyreshill, a moderate level of preservation of values was obtained due to the poor original state of the building and the need for extensive renovation. Its comfort and utility today are great, but the energy use is a bit too high considering the energy efficiency measures carried out.

7 Organisation and management of the Halland Model

7.1 Political background and origin

For investigating organisation, management, and teamwork, six interviews were performed with two engineers, an architect and three conservation officers engaged in the restorations. Five of them were engaged in many or most of the restored objects and one just with one object. The origin of the Halland Model, and a prerequisite for its execution, lies in a new approach to built heritage and a series of political decisions in the 1980s. Above the national level the Granada 3.X.1985 Convention was passed in the European Council in 1985 urging member states to take action on legislation, public supervision, planning, education and research in conservation, protection and maintenance of built heritage. Sweden was not a member state at the time, but nevertheless signed on. A new view on built heritage and conservation was now also formed on an official level with new texts in national legislation. Care for our built heritage was to permeate all sectors of society and be recognised and handled as an integrated part of the regular planning. The new Planning and Building Act stated that 'Alteration to a building shall be made cautiously, with regard to the building´s characteristic features and with its constructional, historical, cultural, environmental and artistic values sustained' (*SFS 1987:10*). There was also the Heritage Conservation Act serving as core legislation for and as basic protection of Sweden's historic environment including buildings and monuments, ancient remains, archaeological finds, ecclesiastical monuments and specified artefacts (*SFS 1988:950*). A support system was launched for inventories of built heritage. All municipalities in Halland were inventoried eventually, and an action plan for restoration of historically valuable buildings followed. The inventories and action plan were essential.

7.1.1 Societal background

In the decline of the construction sector during the 1990s many construction workers became unemployed and apprentices had difficulties in getting their reqired experience. In short the County Labour Market Board, the County Administrative Board, the County Museum, the employers' organisations and the Building Worker's Union started a discussion that resulted in a concept by which more than 1000 construction workers were trained in traditional techniques and materials, and about 100 objects were restored. An entrepreneurial model was developed in which a trading zone was created and defined as an active arena for negotiations and a field of force corresponding to the different actors´ policies, values, facts and resources. Gustafsson´s thesis (2009) demonstrates the role the heritage sector can have at the negotiating table in terms of supporting regional sustainable development.

In 1995 Sweden joined the EU whose general idea was to strengthen the regions and their development, which needed horizontal collaboration. The 1990s was a period of change between industrialism and post-industrial society. Old strict sectors with systems of vertical hierarchies were still prevalent. The Halland Model was a successful effort to make a shift from vertical hierarchy to horizontal collaboration in a social context and in a working environment. It was possible because each organisation had its own specific role and responsibility, which were respected without interference from the others. The industry's aim was to cope with the recession and retain the labour force in Halland and the union and Labour Market Board cared for the unemployed while the aim for the County Administration Board and the Museum was preserving built heritage. A construction consortium was created to organise the coordination and negotiations with the public and private sector, municipalities and owners of real estate, but also tourism and culture industry etc. to find new

activities appropriate for the restored objects. The user value was in focus in this entrepreneurial model and restored buildings became valued as resources to develop.

The County Museum created a bank of objects in need of measures, and a method was developed to select objects. It was based on market need. Suggested measures for each object were compared and matched with the professions among the unemployed construction workers. Sector boundaries were crossed in the horizontal work and the different systems and cultures could cooperate. A trading zone was formed for economic growth and regional development. From a planning perspective, the different specialist roles transformed into generalist roles overviewing not only labour policies and preserved heritage but also social, environmental and economic views. Separate sectors with vertical hierarchies were transformed in the horizontal cooperation for strategic regional development. This kind of networking society is common today but was new in Halland in the 1990s. The concept as a whole was permeated by horizontal thinking, from the planning to the management of the construction work.

7.2 Management and the teams' work

7.2.1 Horizontal and democratic organisation

The Halland Model was created at a time when the national and traditional vertical hierarchy was replaced by a horizontal regional cooperation. Horizontal thinking permeated the whole concept of the Halland Model and also communicated and transferred into the teams at the construction sites.

A major strategy for managing the teams was to choose a democratic type of management and to create inclusiveness. Democratic types are dynamic and transformational, where dynamic leadership is flexible, seizes initiatives, is both task-oriented and person-oriented, and is often process oriented. In the transformational sense it is about setting goals and strategies and conveying these to the co-workers to make them feel involved, engaged, and responsible (Larson & Kallenberg 2006).

A key action was to let everybody on all levels be involved. The overarching objective — save the jobs, save the craftsmanship, save the buildings — was communicated and could be understood by everybody at the introduction and provided a group identity, even in the orientation phase. The typical second phase of conflict and control (Larson & Kallenberg 2006) was handled by creating a relaxed atmosphere with respect, care, inviting initiatives and autonomy. Communication was important and discussions were common throughout the process. Everyone was invited and expected to participate actively. A form of direct democracy was created which was time consuming, but the overall objective was to perform high quality preservation with sustainable materials and prioritising traditional methods.

7.2.2 Transparency, trust and care

The horizontal and democratic organisation was also carried out as part of a strategy of transparency for creating trust and involvement leading to individual responsibility. A high degree of safety was also established at the construction sites. The best craftsmen were chosen as supervisors for no more than three apprentices at a time and the teams were small. All measures aimed at creating good working conditions.

The inclusive and transparent organisation also led to pride and satisfaction in doing something that was appreciated by many, which was further reinforced by the positive image of the Halland Model in different media.

7.2.3 A learning organisation

One way of making everyone participate actively was to encourage the workers to make proposals for improvements. All suggestions were discussed and decided on democratically. After testing and evaluations of the proposals for improvements they were fed back into the organization. The workers´ engagement gave them direct and visible results in their own work. An additional interview was conducted during Phase 2. When visiting one of the very first objects restored to assess values, the owner told a long story of worrying about who would work on the building, what responsibilities each had, time delays, supply of materials and paints, etc. Eventually he finished the restoration by himself. This was in the early 1990s. Comparing this story with the other six, the conclusion is that from the beginning the organisation was led by a trial and error method in which every step and action was analysed for improvement and this routine likely prevailed through the duration of the Halland Model making the whole organisation better and better, for each object that was restored. This might be the origin of the successful transparent organisation in which everybody was informed, involved and engaged, and in which evaluations were continuously made for improvements, which is a sign of a learning organisation. The overall assessment is that the working teams' performance, and the outcome of the restorations, reported above, were of high quality and both the workers and management are still proud of the results. All informants in Phase 1 described the Halland Model as a success, which was also the view taken by the media.

7.2.4 The importance of discussion

The most balanced example, with regard to both energy efficiency and preservation of historic and cultural values, is Teatern in Laholm. It was the only building where actual discussions, on the edge to conflict, arose (about the ventilation system) between the different professions. Two of the six informants mentioned this discussion. Maybe one should not draw a conclusion too far ahead, but it seems that pushing our interests, regardless of which side of the matter we are, makes it possible to reach further ahead, in this case implying both a high degree of preservation and low energy use. So if a conclusion could be drawn from this it would be that one should not be afraid to take part in a discussion. Instead, one could encourage it and prepare for it by formulating good arguments.

7.2.5 Further development and lesson learned

The conditions that prevailed when the Halland Model was conducted are no longer relevant. Is it possible to find other unifying factors for achieving the same good working climate and results (Gustafsson, 2009; Norrström, 2011) today? Could it be a matter of management and could a systemic thinking be one of the factors? How can teamwork be designed? In analogy with what von Wright (1993) says about equality in society, one could assume that a total equal cooperative work might not exist without reducing individual freedom and cooperative work with total freedom might not exist without creating inequality between the participants. All modern societies are faced with the inherent conflict prevailing between the values of freedom and equality of which there is no *solution* as such. Neither of them is negotiable, but in terms of individual interests and collective interests in a collaborative professional group, the practical matter of balancing values and properties must be a subject for negotiation. So how can balance be designed? Are different disciplinary matrix and values compatible or comparable? Whatever the answer, it must be based on transparency and trust, and a premise for this is to understand, and this must be further developed.

Understanding of the involved professions' specific skills and disciplinary matrix or doxa is important for exploring possible designs for models of cooperation.

PHASE 2

8 The case study in Phase 2

The case study design established in Phase 1 has been used also in Phase 2, but with fewer methods and workshops being the most important. The research design was mainly permeated by traditional linear systems thinking of cause and effect for solving complicated problems during its first two years, but also of systemic thinking in exploring and describing professional methods and management and collaboration between professions.

In the systemic thought linear thinking is replaced with a non-linear or dynamic thinking that takes into account the vast web of human actions and relations which are seldom linear. These thoughts are described under heading 8.4 where interviews are reported. In Phase 1, reductive systems thinking for generalisation of facts and data, was used for coping with the complicated task of balancing the physical issues, energy balances etc., while systemic thinking has dominated Phase 2 in order to understand the specificity and complexity in the different processes and relations.

Understanding, and design, of the processes in the working model and the connected working methods for collaboration have been the focus during Phase 2, benefiting from the interdisciplinary cooperation within the academic world and transdisciplinary cooperation between academia and practice which have been guiding. The architect´s 'designerly' way of thinking and working has been of more use in Phase 2.

The key in both Phase 1 and 2 was an understanding of differences and similarities focusing on similarities. A core action for this in Phase 1 was to investigate restored buildings and assessment methods used by the different disciplines focusing on the architects, the conservation officers and consultants, and the engineers. In Phase 2 further and wider descriptions have been made of the topics, professions and their disciplines.

8.1 Methodology in Phase 2

The case study methodology according to Yin (2009) provides a firm yet permissive structure suited for exploratory, explanatory and descriptive research as was stated in chapter 5, using a mix of methods, approaches and embedded units of analysis. The case study with the five units of analysis showed in table 8.1, applied to the Halland Model in Phase 1 has now in Phase 2 been extended by studying the units in their contexts. The bottom-up study with its base in actual objects and practical methods for assessment and collaboration has shifted to a top-down study of general structures and patterns of paradigms, disciplins and the professions' general methods. The units 1) Energy efficiency, 2) Cultural and historic values and 3) Architectural qualities as topics with their different definitions and roles are described in chapter 9.

The fourth unit, 4) Legislation, is an important part of the societal context that reflects society's approach toward, and treatment of, energy and preservation issues and has been further studied in chapter 10. Unit 5) Management and teamwork was an important unit for the development of the working methods and a new additional analysis of the conclusions from Phase 1 has been made and is presented in chapter 11.

The working model designed for weighing requirements has emerged from the results and conclusions drawn from the units of analysis within the case study and developed from there. From the framework of the case study the main methods used for this part, Phase 2, were conclusions and experience from Phase 1, literature studies, interviews and workshops for exploring, describing and analysing the aspects of methods and processes, concepts and approaches.

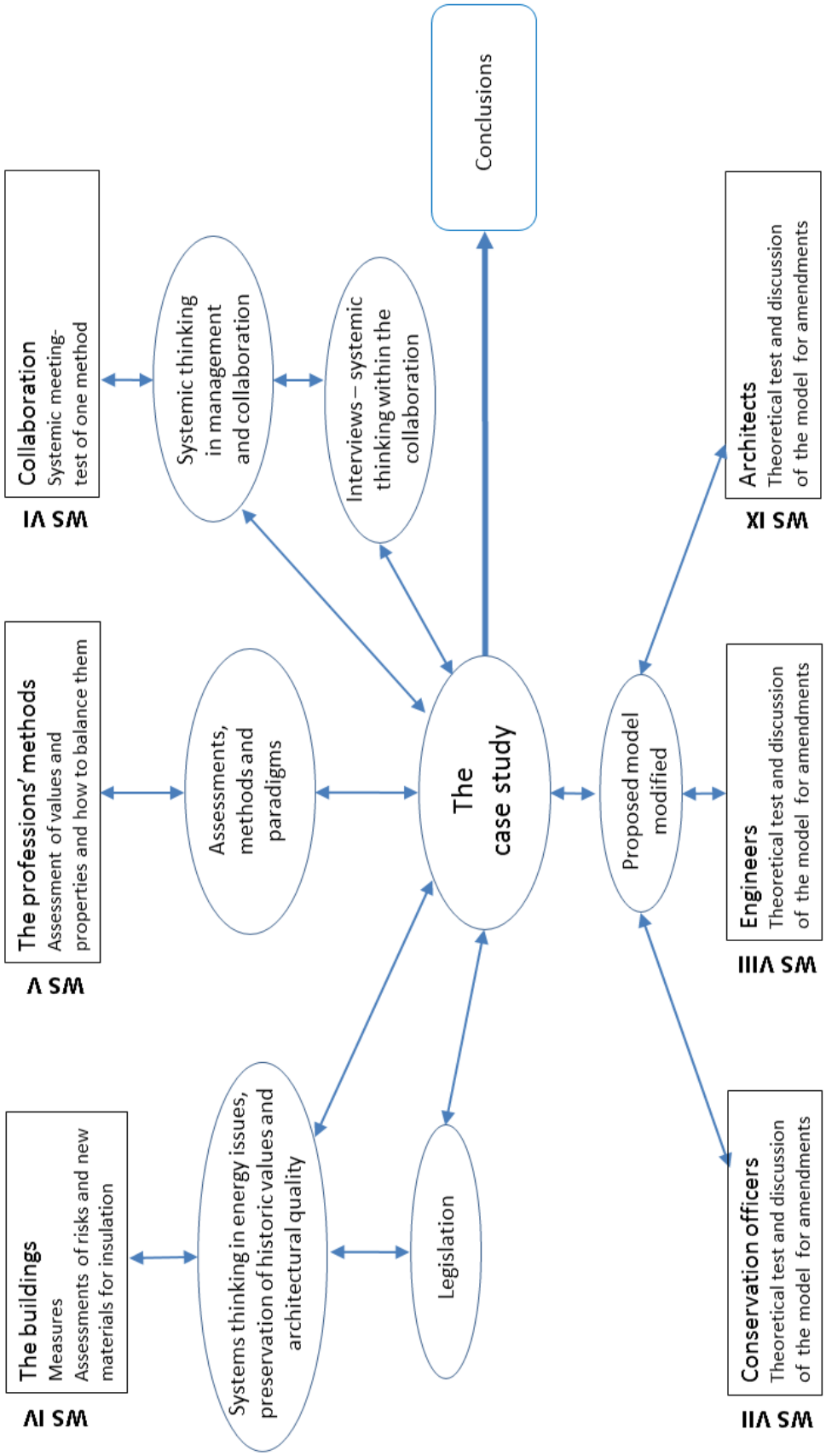


Figure 8.1 Overall scheme for the EEPOCH project for planning of the research in Phase 2.

The focus has been on understanding and the design of the processes for the working model and the connected working methods for collaboration. The topic and task in Phase 2 has demanded other kinds and more conceptual tools or practices of thought where some aspects of the architect's conceptual and 'designerly' capability or way of thinking and working have been used as a method. These parts are described in chapter 12 together with paradigms and modes concerning all three professions. The professions´ similarities and dissimilarities are described in chapter 13. Figure 8.1 above shows the scheme for Phase 2 with the workshops around the case study and the parts investigated.

Units of analysis	**Main aspects to explore, describe and analyse**	**Methods**
1. Energy efficiency	the topic definition context	literature studies workshops
2. Cultural and historic values	the topic definition context	literature studies workshops
3. Architectural values and use values	the topic definition context	literature studies workshops
4. Legislation	content and meaning consequences approaches	literature studies workshops
5. Management, teamwork	structuring results, strategies, tactics methods and processes approaches and stances	literature studies interviews workshops

Table 8.1 Main aspects investigated in phase 2 and the methods used as a basis for each unit of analysis.

One aim of the study was to bring issues in practice into academia for research, and explore howc theory can be of use for practice, in practice, and to bring the results back to practice. The first issue as a practitioner was how to make use of the academic world of theory in practice, how to connect them, to understand the interconnection *between theory and practice*. Metaphors and analogies are common architectural tools in academia as well as in practice, and it soon turned out to be what happens in between that is most interesting: the interface, the interacting, the meeting, the intermediary, the bridge or the bifurcation. Bridging gaps is a commonly used metaphor but the parts that are to be bridged are still in their specific localities. Bifurcation would be a more suitable metaphor for the objective of this study. Water is a possible metaphor for the ability to move fluently in either direction, visiting either connected rivers by the bifurcation, going upstream or downstream in either river, with access and direct connection to the sea. In reality this picture consists of knowledge and relations, and specifically for this thesis it consists of workshops that have been decisive for its development. Through the bifurcation-metaphor it was easy to look at it as giving and taking on the same level, travelling the same rivers but sometimes with different vehicles. This is a metaphor for what is also called creating a transdisciplinary arena. The six workshops in figure 8.1 above formed the arena and have directed the design in an iterative way giving invaluable knowledge and insights, of how the model and methods should be designed and what they should include. Looking at the workshops on a timeline the first ones were about finding out what was needed in practice, to co-create and decide on which units to investigate together with the practitioners, moving

towards a theoretical understanding of practice, and finally merging practice and theory when presenting the working model at the three last workshops.

8.2 Approaches

Multidisciplinary, interdisciplinary and transdisciplinary approaches were essential when performing the case study methodology in both Phase 1 and 2. Professional specialisation is more the rule than the exception today. Sigfried Giedion (2008) summarises the situation.

'Our culture has a structure different in many of its aspects from the cultures that grew up in the pre-industrial periods. In the baroque period, for example, Leibnitz arrived at the discovery of the calculus from a starting point in philosophy. He moved from a general ─ one might say a cosmological ─ outlook to this particular discovery. With our inheritance from preceding generations, we are obliged to adopt a different starting point and follow another route. We must take our departure from a large number of specialised disciplines and go on from there toward a coherent general outlook on our world.'

This was actually written some decades ago and the specialisation has increased considerably since then and is still increasing. Cooperation between disciplines and professions is necessary. Specialisation is never wrong but has little, or less, meaning without a context and a wider perspective. If 'our culture is like an orchestra where the instruments lie ready tuned but where every musician is cut off from his fellows by a soundproof wall' as Giedion continues, the task for the research community is to break down these barriers which is also the case and has been for the last decades. Architecture must not be limited but rather open to other disciplines and that is the main feature within this thesis.

8.2.1 Interdisciplinarity, multidisciplinarity and transdisciplinarity

The new combined field of built heritage and energy efficiency is, as mentioned earlier, too broad and complicated to be dealt with adequately by a single discipline or profession. That is why a multidisciplinary research model was designed representing three areas. The research model comprises three professions: architects, conservation officers/consultants and engineers from academia as well as from practice. The different notions inter- and transdisciplinarity describes the constellations of the spheres in which the disciplines and practices work as showed i in figure 8.2 and 8.3.

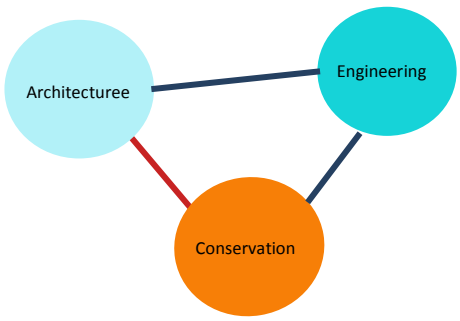


Figure 8.2 The multidisciplinary model consists of three areas: architecture, conservation and engineering.

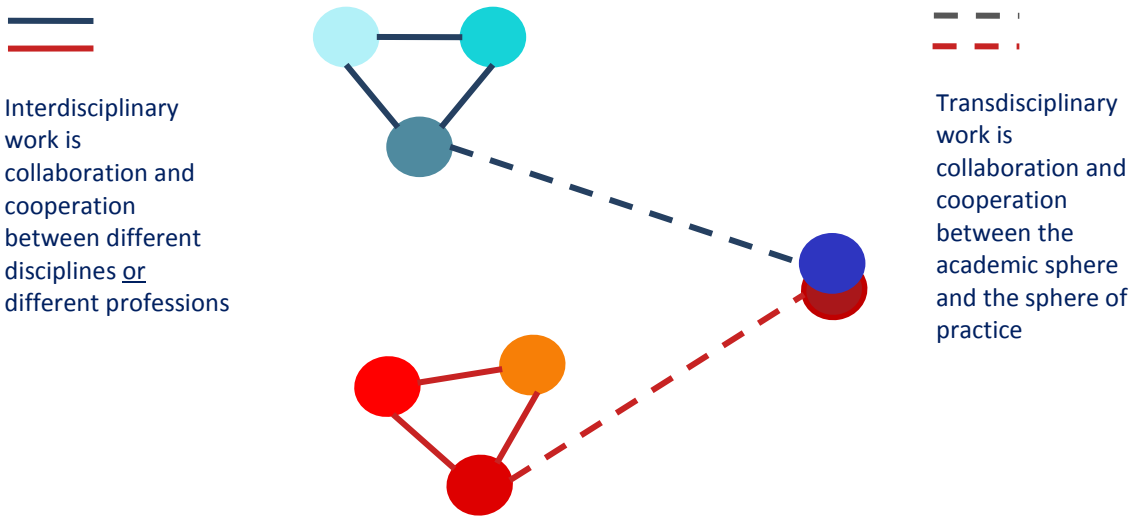


Figure 8.3 Transdisciplinary Work; developed from the 'Handbook of Transdisciplinary Research' by Hirsch-Hadorn et al (2008)

8.2.2 Interdisciplinary work differs from interdisciplinary analysis

Multidisciplinary, interdisciplinary and transdisciplinary *work* differs from inter-, multi- or transdisciplinary *analysis* according to Seipel (2005). Multidisciplinary analysis draws on the knowledge of several disciplines, each of which provides a different perspective on a problem or issue, making a contribution to the overall understanding of the issue, but in a primarily additive fashion. This is the outcome from several of the workshops. Interdisciplinary analysis requires integration of knowledge from the disciplines being brought to bear on an issue so that the resulting understanding is greater than simply the sum of its disciplinary parts. It involves integration and synthesis, and requires action by different disciplines or by academia and practice in which case it refers to transdisciplinarity. This was the outcome especially of Workshop VI and VII.

8.2.3 General pragmatic approach

The topic and task in this thesis has also demanded another kind of conceptual practice. Architecture appears predominantly as an applied science for practicing architects. Hence pragmatism is a common philosophical stance. This also corresponds well with the design process, which is inductive and abductive. Designs are often both multi-dimensional and highly interactive. Very rarely does any part of a design serve only one purpose (Lawson 2006). Pragmatism is a basic or common philosophy, or approach, possible to use from an architect's and designer's point of view due to its experimental spirit of science according to Bernstein (1999) who claims that pragmatism sees science as inquiry, as a perpetual, critical and self-corrective process. Man seen from this point is an active craftsman, advancing new hypotheses, actively testing them, always open to on-going criticism, and reconstructing himself and his environment. Yaneva (2009), who has studied architects and architecture, asserts that buildings are pragmatically knowable, and therefore a pragmatist approach is appropriate 'to understand the architectural specificity'. Furthermore, architects, urban planners, developers, designers, engineers, and clients constantly, in their daily routine, prioritise the pragmatic content of action and not of discourse. The research described in this thesis recognises and uses the described pragmatism, but also in rejects the Cartesian dualist worldview separating mind and matter, reason and emotion, theory and practice, and accept the thought at 'the core of pragmatism' that our theories must be linked to experience and practice (Rylander 2012). Consequently, professionals from academia as well as from practice have been invited to workshops and for taking part in the referencegroup and expertgroup.

8.3 Workshops as method and decisive outcomes in brief

The workshops have been important for the research design forming a transdisciplinary arena, but also as a method for designing the working model as an iterative design process. A method for participation was necessary to get an overview of and input from all different aspects and perspectives of all involved topics, and to share with other professions. It is also about a conscious choice relating to the design professions. For practitioners architecture appears as an applied science where pragmatism is a common stance corresponding with the design process. Designs are multi-dimensional and interactive serving many purposes. Furthermore, architecture is not only descriptive, but also prescriptive, and must always consider human wellbeing and the different functions of a building for this purpose. There are many more areas that an architect, engineer or a conservation officer should have knowledge of for cooperation with other professions. The workshop design forming a transdisciplinary arena is therefore an important choice as it permits sharing of knowledge beneficial for all participants and at best also co-creation of new knowledge.

Furthermore, one response to the research design for this study presented at a seminar, was from Professor Brian L. Atkin, in May 2011: 'A detailed case study or studies, supported by in-depth investigations involving practitioners, seems like the best way, possibly the only way to attack the problem. I am not sure how else you would get to the heart of the problem'.

One of the aims with addressing both academia and practice has been to explore how theory can be of use for practice, in practice. The subject matter has been extrinsic and outspoken at some of the workshops, but also discussed indirectly by the methods, practices and projects presented. The literature has been explored for better understanding of what has been lectured and for expressing what has been experienced at the workshops. These circumstances have also led to development of the content in chapter 12 and 13 about disciplinary conditions and the professions methods as being influencing factors on designing the working model.

8.3.1 Practical implementation

Chapter 14 comprises summaries of all nine workshops carried out in Phase 1 and Phase 2. The summaries vary in length depending on several causes. Workshops II, VII, VIII and IX were quite short sessions, between two and four hours, a small number of participants, two or no lecturers or only one selected subject for discussion. These factors are reflected in the summaries that are shorter. Workshops I, III and IV lasted a whole day and had five lecturers speaking on various subjects. These summaries are a little longer. Another influencing factor for all the shorter summaries is that these are based on handwritten notes and occasionally supported by the lecturers' presentation-files, if available. Workshop V and VI were recorded and transcripts made. This was extremely time-consuming and difficult work, especially transcribing discussions with many people taking part. That was a drawback and needed support from a music studio with special noise reduction software to be carried out. The advantage was being able to go back, listen many times and think through what actually was said. These summaries are much longer, particularly Workshop V, where six people lectured on a variety of subjects and twenty participated in the discussions.

Workshop I was held at Heritage Halland which made it possible to visit the first object in the adjacent block, Fattighuset in Halmstad which was the object and the starting point for discussions that day. Workshop II was carried through at Teatern in Laholm, the second object to which all five units of analysis were applied. This choice was a practical hands-on approach and the buildings' constructions, values and interacting technical systems could be discussed *in situ*. Most of the participants in these two workshops were practitioners. In workshop V and VII, both held at Heritage

Halland, the practitioners also dominated. Participants from academia dominated in workshop III, VIII and IX, and number IV and VI had a quite even mix and all five were held at Chalmers.

8.3.2 Decisive outcomes of the workshops

The workshops have been decisive, worked as a transdisciplinary arena for discussions on the different issues throughout the project, and brought the project and the design of the working model and methods forward step by step.

In Workshop I the first object, to which initially three units of analysis had been applied was discussed and the methodology approved, but from this discussion some conclusions could be made. The most important conclusions impacted the framework for the project. The discussion resulted in the inclusion of legislation and architectural values and qualities as units of analysis, which was not planned from the beginning. The importance of control on moisture migration was emphasised and it was understood that it must always be part of any assessment or investigation of a building. This was part of defining priorities of measures and actions where indoor environment was a top priority on the list.

Workshop II was about energy declarations and energy efficiency measures. The lecture concerned the requirements for a person performing energy declarations, but also what is required in a declaration followed by how an energy declaration actually is carried out in practice. This insight into what is actually required of a certified energy expert and his or hers vast knowledge and experience was decisive for the development of the working model. It became even clearer that the model needed specialists. The legislation on energy issues was also discussed, for example, why the energy source is not accounted for in the energy demands, and the somewhat contradictory formulations in the legal framework.

The third Workshop comprised different parts within the Heritage sector; new kinds of assessments; a research agenda and today's practice in Italy; theory of conservation, and about the Halland Model, but also about laws and regulation concerning preservation and caution with heritage values. The testing of a new narrative method for assessment of cultural and historical values in our built heritage was inspiring both for the possibility of thinking in new directions and for the choice of a narrative method. The Italian view was revealing, with its strong connection between philosophy and theory on one hand and practice on the other, as was the presentation of theory in conservation. This was decisive for the continued orientation of the EEPOCH project and development of working methods.

Workshop IV was about the buildings and risks when taking different energy efficiency actions. New materials for insulation were presented and discussed. Risk assessment and moisture problems were also topics for lecture and discussion. This workshop highlighted the complicated task of making a building's different systems interact. It was understood that when working with an existing building, several specialists and different kinds of expertise are needed. The question about how these specialists would work together persisted. The new thin insulating materials seemed very promising for use in existing buildings, but are not yet common in use and are still very expensive.

The themes for Workshop V were properties and values, the professions and their methods, approaches and philosophical stances, and the balancing of interests. The lectures and discussion on valuation, assessment and weighing of interests, the paradigmatic shift within the Heritage sector connected to philosophy and theory, and views on the trading zone were decisive for the development of the project. After this workshop it was clear that a working model with weighted figures was no option, and that a trading zone, arena or other place had to be created for communication and negotiation between the different professions. Another decision concerning the

working model was that assessments and valuations must be carried out by professionals closely connected to the client at an early stage before extending the trading zone or arena to include users and other interests. In the discussions, the problem of the lack of inventory of built cultural heritage in Sweden was one important topic. Another was architectural quality and the changes in legislation. An idea occurred about a new kind of inventory consisting of a mix of interests and a decision was also made for taking a more thorough look at the legislation.

In Workshop VI a systemic meeting was carried out with participation from all three professions. The initial general questions motivating Workshop VI were: how can one get a co-worker to 'walk in someone else's shoes?' How could one understand and describe the different existing values within different professions? And how can we meet on equal terms? The systemic meeting was used in a new context according to the leader of the meeting. It was revealing how a narrative can be interpreted in many different ways by different professions. It pointed out how differences and similarities in professional and personal experiences impact the interpretations, and also the importance of clear and transparent communication. The lecture and the discussions it brought gave many new angles, but also a view of the complex state or everyday life we have in the building sector where many stakeholders, must agree and which is governed by the market, politicians and laws and furthermore is subject to public interest not only due to the building sector´s impact on the climate but also because it has formed our history and therefore constitutes our daily life.

Workshop VII, VIII and IX were all focused on presentation and discussion of the proposed model for amendments. Conservation officers, engineers and architects were invited to separate workshops, in contrast to the previous ones in which the mix of professions had been an essential condition for fruitful discussions. The aim was to focus on the prioritised issues for each profession respectively. In Workshop VII the process and the weighing of interests and the four-grade scale was essential. A decisive question was about how to manage a situation if two possible measures and their arguments appears to lead to negative consequences and are posed against each other in such a way that the only way out seems to be to choose the 'lesser evil'. The engineers in Workshop VIII suggested a practical amendment concerning the placement of control and regulation system in the documents. In Workshop IX the client's role and the use and possible commercialisation of the model were discussed. An important insight was that the arguments behind the proposed measures must be explicit in the process to enable a discussion weighing pros and cons on equal terms, which in turn is a prerequisite for creation of trust and confidence and a good working climate. Seen altogether these three focused workshops were encouraging with participants who suggested improvements, and all three groups were positive to the working model.

8.4 Interviews and their outcomes

To both get an orientation of its origin and gain more detailed practical information about systemic thinking some interviews were necessary because the disciplines of psychology and social constructivism are too big areas to search through singlehanded. Four interviews with three professionals were carried out — two with an organisational consultant, Sarv, one with Wetterdal, who is also an organisational consultant, and one interview with a psychologist and psychotherapist, Korpelainen. The interviews were structured and openended with prepared questions. Notes were taken during the interviews and the informants have reviewed the transcripts afterwards for errors and approved the contents. All three recommended books for further study and confirmation of their information, which has been very helpful. The three interview protocols are attached to this thesis.

8.4.1 Operative groups

From the interviews it became clear that the use of systemic thinking in Sweden has a history and also has two different orientations. The first has its origin in the 1970s with group therapy. It was influenced by Argentine Doctor Enrique Pichon-Riviére´s operative groups and British psycho analyst and social psychologist Siegmund Heinrich Foulkes´ group analysis and actually emerged and developed individually and independently from each other. Both focused on the group processes and context, working with group reflection as a method as well as developing 'action research, in which the dynamics of change and development would be studied from the vantage point of the group analyst as a participant observer' and furthermore '[g]roup-analytic theory does not attempt to replace any part of psychoanalytic theory, but rather complement it with its findings and concepts' (Tubert-Oklander and Hernándes de Tubert 2004). The main characteristic in an operative group, according to Doctor Pichon-Riviére´s view, is that it meets to carry out a common task which becomes the main organizer of the group's dynamics, and the task could concern a study, therapy, decision making, or solving some specific problem or other tasks. The coordinator or co-thinker interprets the group dynamic and reflects together with the group in an evolutionary way from ordinary or common thinking to scientific thinking through five stages where a set of methods is in use ((Tubert-Oklander and Hernándes de Tubert 2004). This is a successful practical use of and variation of analysis. The aim in this thesis, however, is not to use or report on clinical analytical work, but rather to study the ordinary practical work within different organisations.

8.4.2 Organisational theory

The second orientation of systemic thinking focuses on systemic leadership and organisation with systems theory as its base. Within the first-order of cybernetics focus is on the observed system comprising linear systems thinking of causality. The second-order of cybernetics also takes into account impact from the observer. That implies looking at both context and all relations, which are more complex in the circular systemic thinking of relations between people, and is aimed at co-creation. This means a settlement with the traditional linear causal explanation that characterizes our Western culture according to Hornstrup et al (2012). The notion *cybernetic* was introduced in 1948 by the American mathematician Norbert Wiener as a general term for the study of communication with and control of complex systems (NE).

According to Stratton et al (2011) the conceptualisation originally emanates from the systemic discourse and the Milan systemic therapy in the 1970s with its family therapy used and developed by Cecchin and others. This therapeutic part has the models, the language and methods but an organisation is bigger and therefore also holds a bigger internal complexity. The largest influence for organisation consultants we have had in Sweden emanates from Susan and Peter Lang from U.K. and the Kensington Consultation Centre, KCC. It started in 1985 and ceased operations in 2010. The early KCC 'human systems' were developed from a mechanical, way of conceptualising family systems to the current focus on discourse, with communication, linguistic and social constructionism, and post structuralism. Furthermore, it has developed into notions of stories, discourses, narratives, and multi-positioning. The current systemic work includes people working in public services, business and other organisations, schools and communities (Stratton et al 2011).

Wetterdal, an organisational consultant, informed that in Denmark and Sweden, today it is common to use methods or tools like *appreciative inquiry, AI*, which is a positive relational approach to change, helping people to find solutions instead of defining and dwelling on problems. It is the type of questions that are important to achieve this and how they are conveyed. The informant use AI and says that it is very effective and that, with small means and by knowing how to use it, one can get

good responses and results or actions, to help and see how people come to an understanding and insight. Change, she explains, is possible through what we have in common, what we can share. For AI she mentioned Cooperrider and Shrivastva as inspiring. In her work there are both positive and some more negative matters to manage. For the latter she sometimes uses a method that Michael White has written about – externalisation – which in this case is about creating metaphors, but she also uses analogies. It can be very helpful to put something outside of oneself because in this way it can be taken a little less personally, making it easier to process and to talk about the matter. The basis for her work is the social constructivist perspective, systems theory and a holistic perspective.

From being a form of work developed and used in the therapeutic context, reflecting teams have become an increasingly common form of work in the context of tutoring, coaching and team development, according to Hornstrup et al (2012). In general one could say that this form of work is suited to set focus on language and appreciation, as important elements in the development of constructive collaborative cultures.

8.4.3 General systemic thinking

In the kind of systemic thinking with the systemic meetings which Hans Sarv (2013a) has originated and developed, dynamics and change prevail. It is also built on a bidirectional relation between system and the individual, based on systems theory and a holistic perspective. Another aspect that Sarv mentioned and writes about is the experiences of those who have come a long way in this development. They perceive a job satisfaction and pride in developing good working conditions for other actors which Sarv perceives as key factor (2013a). This is very similar to the experience of management work and teamwork within the Halland Model.

Learning from the Halland Model, collaboration should preferably be based on transparency, trust, and understanding. By using systemic meetings, a communication is facilitated through the actors' understanding of each other's work. The systemic meeting is about equality and a neutral working method based on the participants' autonomy and ability to power. The approach has been used, for example, in car industries, construction businesses, and in the field of healthcare and municipal organisations (Sarv 2013b; Ainalem 2013a; 2013b). Systemic meetings are used for knowing and understanding, for insight, overview and action. It was tested in Workshop VI and is described in chapter 14. Individual interpretations can be processed in the meetings in an empowering way. The activity is collective but aims at individual understanding, learning, responsibility and action. It strengthens co-organisation, the collaborative part, as well as self-organisation, the autonomous part, and the relations between them.

Systemic thinking and the use of systemic meetings could be one of the practical and appropriate working methods for use in the working model. The methodology as a whole could also be combined with any other process methodologies. The idea in the working model is to use it for three purposes: as a routine for continuous reconciliation, as a quality assurance, QA, measure to record that everything is working; when there is a need to deepen and clarify a problem/solution and its consequences in all aspects, or as many as possible; and finally when there are diverging opinions with equally strong arguments for a solution/measure and there is a risk of conflict. In the latter case it would be especially important to distinguish between a person and a potential problem, and to have an agreement on confidentiality. In the interviews with the organisational consultants it was confirmed that systemic thinking, the different methods and also systemic meetings would work for these occasions and many more. 'The methodology is designed for this' was one comment.

9 The three topics

9.1 Energy efficiency and high energy performance, unit 1

9.1.1 Definitions

There are many expressions on altered energy use, and energy efficiency as a notion is used widespread to denote energy behaviour in various ways. Sometimes it can refer to energy saving which usually means decreasing the energy use by decreased comfort through, for example, lowered indoor temperature. It may also refer to economic use of energy, which means to redistribute a given amount of energy or costs for smarter use. Economically one replaces running costs with investment costs, for example, by adding insulation. Energy efficiency in a strict sense would mean to decrease the energy use while improving comfort. In short one could say that energy efficiency in buildings is a measure of annual energy use for achieving given functional qualities.

The energy need is in turn, determined by the intended use and the demand on indoor climate, and the buildings´ construction and mechanical srvices. The energy needs´ environmental impact depends on the size of the energy need, but also on technical systems, how efficient they are and what energy sources they use. This is the structural basis for the European Union´s directives on energy. The definition of energy efficiency in Directive 2012/27/EU, Article 2, is the ratio of output of performance, service, goods or energy, to input of energy. Energy savings is defined as an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption. According to the directive, energy efficiency improvement means an increase in energy efficiency as a result of technological, behavioural and/or economic changes.

9.1.2 Energy objectives

Buildings account for about 40 % of total energy consumption in the Union or about 5000 TWh. The sector is expanding, which is bound to increase its energy consumption. Therefore, reduction of energy consumption and the use of energy from renewable sources in the building sector constitute important measures needed to reduce the Union’s energy dependency and greenhouse gas emissions according to Directive 2012/27/EU. One of the reasons for a new directive is that the Union is unlikely to achieve its targets by 2020 based on the former policy mix.

The aim for the directives 2012/27/EU and 2010/31/EU is to allow the Union to comply with the Kyoto Protocol to the United Nations Framework Convention on Climate Change, UNFCCC (1998), its long-term commitment to maintain the global temperature rise below 2 °C, and its commitment to reduce greenhouse gas emissions by at least 20 % below 1990 levels by 2020. It is also part of promoting the security of our energy supply. Imported fossil fuel accounts for more than 50 % of the total energy need today, which partly will be met by increased use of renewable energy sources such as wind, solar, aero-thermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. In Sweden more than 50 % are renewables in the energy system according to *Energiläget 2013*. The aim of the directives is also to promote technological development and create opportunities for employment and regional development, in particular in rural areas. In the *Europe 2020* strategy, COM(2010) 2020, the energy efficiency target is one of the headline targets of the Union´s new strategy for jobs and smart, sustainable and inclusive growth.

9.1.3 Energy efficiency

Energy efficiency is needed on all levels from production to transport and distribution of energy, and on the consumer level. Many actions defined in the directives concern the tertiary sector – buildings and all energy-related products, emphasising major refurbishment of the building stock. This issue of energy efficient buildings is quite complicated. Most of our future built environment is already constructed, and hence we have to make the existing building stock more energy efficient.

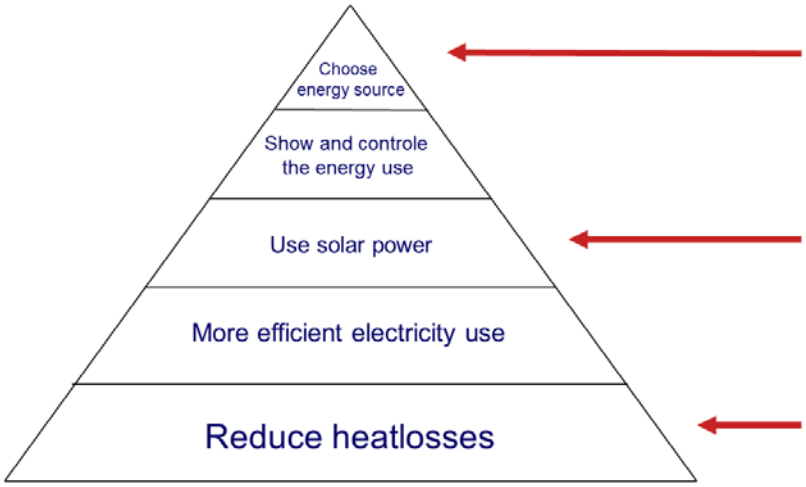


Figure 9.1 The Kyoto-pyramid emphasises the reduction of heat losses.

The Kyoto-pyramid in figure 9.1 shows the different levels toward increased energy efficiency in buildings, starting with reduced heat loss, which is no problem when planning for new construction but is more complicated in existing buildings. Exterior insulation is preferable in terms of preventing thermal bridging, but the measure always alters the façade to a certain degree. This is normally not desirable in buildings with cultural and historic values. In general major refurbishment in which this measure could be chosen is a big investment, one that does not occur often in a building´s life cycle, so the pace for a refurbished Europe will naturally be slow. The second level is achievable in all kinds of buildings just like the fourth level. Using solar power, the third level, is always positive but it requires installations that do not distort the façades of historic buildings. The choice of energy source must sometimes be decided by the availability, or lack of, space in an existing building, but there are many alternatives. If the first four levels are planned properly in new buildings, the fifth, choosing heat source, may not be applicable at all. Zero or nearly zero-energy buildings need no heating system. Nearly zero-energy is what is required in Directive 2010/31/EU for all new buildings starting in 2020, and in 2018 for new buildings occupied and owned by public authorities. The nearly zero or very low energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

The technical systems and all energy-related products are also addressed in the directives for eco design 2009/125/EC and for labelling and standard product information 2010/30/EU, and both are amended by the directive for energy efficiency 2012/27/EU. Behaviour and use of energy efficient appliances is another important part because of the total amount of appliances in all households and offices, etc. and cost-effective technological innovations such as smart meters must be installed. The metering and billing information for consumers is important. Knowledge of a building´s energy consumption is a condition for running and maintaining it in an energy efficient way.

Energy efficiency in historic buildings is also necessary to achieve reasonable running costs. The historic buildings sometimes have conditions that make it difficult to find solutions for, improving their energy performance. The issues with heating, ventilation and air conditioning are general, though, and do not differ much from new buildings except for difficulties finding the space for these systems in the historic buildings without distorting the interior, and also to predict how the building will react to the concomitant new conditions of temperature and air moisture. These conditions always imply risks.

9.1.4 Risks

Much of the damage in structure of buildings emanates from moisture permeating and being transferred into the materials of the structure. One response is to dry out the materials by heating (Hagentoft 2002) but this is not energy efficient. Using a dehumidifier is more energy efficient and moreover, 'the concept of controlling relative humidity by adjusting the temperature should be used with care, because it may result in considerable moisture migration' (Klenz Larsen 2007). The best option physically and economically is to stop the moisture at the surface or prevent the situation from occurring at all. The indoor air humidity must also be adequately handled by sufficient systems that are flexible, energy efficient and adjustable to the intended use of the premises.

Looking upon the issue pragmatically; if one no longer can live in or work in a building because of high running costs or insufficient design or lack of space suitable for the functions required of the building, there is no practical incentive for preserving it. Avoiding loss of built cultural heritage and keeping the desirable diversity and complexity in our built environment demands caution and care. Finding new functions for old buildings is a priority. And people, for living and working, need a good indoor climate apart from pure shelter. 'A good indoor climate is a basic functional demand and is what gives legitimacy to construction on the whole' (Edén 2007).

9.1.5 Learning from history?

When the oil crises occurred in 1973 the issue of energy supply became topical in many countries. In Sweden the user side was also noticed and subsequently a special programme was introduced for repair, reconstruction and extension with subsidies for added insulation of façades like in photo 9.1 and for engaging energy counsellors in all municipalities.

9.1

Photo 9.1 by Heidi Norrström showing a building with added insulation of façades.

The photo 9.1 above shows a typical building from this era. The stuccoed façade has been clad with corrugated metal without regard to the original material and the appearance. The windows have not

been shifted out, which gives the building a 'hollow-eyed' expression. Nor has any attention been paid to adjusting the foundation, which makes the added insulation look like it has been hung there temporarily, giving the building a makeshift appearance.

When the programme was evaluated later by the National Board of Housing, Building and Planning, *Boverket* (2003), it showed that projects financed by this programme were primarily huge reconstructions and added insulation without consideration for cultural and historic values in our built heritage. Have we learned something from this?

Special advice is given in a report focused on energy efficiency from Royal Swedish Academy of Engineering Sciences *Kungliga Ingenjörs-vetenskapsakademien*, *IVA* (2012). It suggests more specialised energy declarations, performance requirements for components, subsidies for energy efficiency measures etc. Preservation is seen as a conflict of objectives and building regulations that respect architectural values prevents energy efficiency and should be reviewed. Predictability for energy efficiency measures in existing buildings is advocated while at the same time stating that the building stock is highly heterogeneous and most of the buildings will still be in use in 100 years. It is also stated that the 'processes that are currently slowing development must be changed' and the recommendations are:

- Stricter construction regulations for renovation and new constructions
- Adaptation of preservation standards
- More stringent energy-use documentation requirements
- Re-evaluate rent control
- An analysis of credit risk insurance for energy efficiency improvements
- Dissemination of information and experience through demonstration projects
- National competence improvement in energy efficient construction
- Establish a renovation centre
- R&D programmes in energy efficiency in buildings

(IVA, 2012, p. 9)

Cultural historic values in existing built environment is thus defined by IVA as a problem and seen as an obstacle to be removed or at least be given a lower priority in the context.

9.2 Built cultural heritage, values and preservation, unit 2

9.2.1 Definitions

Heritage is traditionally defined as artefacts, buildings, sites and places, cities and natural landscapes. The oldest guarded monuments were connected to individuals and labelled by the supremacy of the victor so the purpose of heritage and the power structure was quite clear. Muños Viñas (2011) describes how this tradition has changed: 'In the twentieth century, a wider category made its appearance: that of "cultural heritage". "Cultural heritage" came to complement, and more often to replace, preceding notions, although it includes *intangible* heritage, such as traditional dances, languages, handicrafts or religious rituals. The general notion of "heritage" is even broader, as it includes non-cultural heritage, such as forests, landscapes or animal species'. So today variety and recognition of diversity are dominant criteria. The inventories of built cultural heritage in Sweden and carried out during the late 20th century have been performed within this new tradition. They include everything from world heritage sites bearing testimony of an outstanding universal value to small private cottages.

An often-acclaimed property of cultural heritage is its intangible value. Intangible, intrinsic and implicit cultural values are attached to objects, sites or places and do not exist independently of them. No heritage value is completely tangible; it can only be interpreted through the intangible. It is a reciprocal interdependency. Accordingly, cultural heritage owns both intrinsic values, forming the social and political uses of heritage, and extrinsic value, enabling the economic uses of heritage.

Heritage can be seen as having a value in and of itself, but also as a common knowledge of society's social, political and economic development. In this it is time-specific and can be reread or reinterpreted in changing times, circumstances and constructs of place and scale. Whatever interpretation is chosen there are some universal traits. The status of antecedence underpins the idea of continuity and ethos of progress, and created emblematic landscapes with certain artefacts fulfil a need to connect the present to the past in an unbroken trajectory, while the past simultaneously provides a sense of ending and start, of a sequence, allowing us to locate our lives in a continuity of events.

9.2.2 Roles and functions

Heritage today is 'burdened with many and increasing public roles and expectations' according to Ashworth, Graham and Tunbridge (2007). They also claim that 'heritage can be conceptualised as a duality: a resource of economic and cultural capital that is simultaneously multisold in many segmented marketplaces', but 'unlike many commercial commodities, the assembly of heritage product is not managed by a single organisation nor even controlled by a consistent purpose'. Heritage producers can be a public/official body or private/unofficial, and at many scales – it is plural. There are different motives for identification: preservation and maintenance of resources and the individual´s experience of heritage are also plural. It is not only the character of the building or site that defines the identity, the user also creates place identity. Places carry many layers of meaning and hence 'pasts, heritages and identities should be considered as plurals. It is an inescapable condition that heritage, as a practice and knowledge, is concerned with both the boundedness and continuity and also the hybrid fluidity of cultures.' Although preservation and restoration freeze artefacts in time whereas previously they had been constantly changing, 'heritage is a moving target while the past is in continuous creation and so are perspectives upon it.' (Ashworth et al 2007).

Materially, the use of cultural heritage is necessary for its survival. If it cannot be used its plural values will deteriorate. Some alterations or additions may thus be carried out, due to, for example, accessibility, energy efficiency, modern functions and uses which are necessary for the economic value. This is vital because 'heritage is the most important single resource for international tourism' (Ashworth et al 2007). So we do have to make alterations, but a building must not be turned into a simulacrum or a twisted copy with no semlance of the original patina. The environmental perspective is always more or less automatically part of a good design and includes a holistic view of sustainable development which in turn is *contextual*. Older existing built environments are usually the result of local or regional material, technique, the workforce's skill and tradition, and consequently all suggested measures and actions should be adjusted to the *local circumstances* (Feilden 2003).

A key question is how we can develop and improve, and build on and modernise, but still take advantage of the qualities found in our built heritage. History is important as a means of understanding oneself. One is the sum of one's history, and this applies to the community as well. One needs this knowledge of history to develop and to make decisions for the future. We have a basic structure to learn from and take advantage of.

We can find possibilities for keeping the historic values in our built environment and create improvements and new functions. Our built environments in Sweden are not densely populated even

though more than 50 % of the population lives in cities. We talk about sustainable development, to take advantage of resources responsively, and our built environment is vital with its soul, history and particularity, and through this it carries its own attractiveness. We have a choice to either adapt an approach in which our environment conforms to a universal, globally coherent style, recognisable everywhere, or to start from our place on earth, our history, reinforcing it and adding new enthralling buildings that communicate in a dialogue with what we already have.

Ashworth et al (2007) point out that our built heritage also has yet another role. The new overall culture of 'want' and instant gratification affect us all. New technologies like Twitter and Instagram contribute to momentarily, now-minted, experienced 'realities'. The now-culture of today and the tyranny of the moment may have a counterweight in the historic environment, providing places and possibilities for people to experience a continuation of progress and development, as being part of a story that reaches both back in history and forward into the future.

9.2.3 The conventions

On the European level, two conventions are topical for the issue. The first one is the Granada 3.X.1985 Convention for protection of the architectural heritage of Europe. The Swedish signing of this convention has a prehistory in which the Swedish tradition of conservation must be seen as connected to a societal perspective. As in many other countries the population in Swedish cities increased quickly, causing a big housing shortage. Most dwellings were very small and lacked central heating and sanitary accommodations. Several studies on the issue succeeded one another from 1920 and onward. Everyone should have a Good dwelling, *God bostad*, which also gave name to the standards that in course of time were brought forward and published from 1964 to 1976. Sweden parted from other countries by not promoting social housing or low-cost housing, and instead giving favourable government loans to and demanding high standard in all new housing (Caldenby 1998).

Despite huge amount of new constructions, Sweden still had poor housing conditions during the 1950s compared with other European countries. This led to a series of political decisions in which transformation and reconstruction of the cities seemed to be the only answer for many politicians. The government forced the construction industry to develop new economical and rational methods, and pushed them even further with the decision to build one million dwellings in ten years, thus giving the construction industry a very strong position. Most old towns in the cities´ centres in Sweden were totally demolished, leaving the towns without any identity or historic roots. There were counter-reactions with demonstrations and many ideological discussions (Caldenby 1998). The strong opinion against the demolition of old cityscapes in the 1950s and 1960s turned the heritage sector towards continuous settlements and whole environments, and old built environments were reevaluated as important and useful. According to Edman (1999), traditional materials and techniques were seen as more healthy and ecological than their modern counterparts, and the construction industry was also criticised for their short-term thinking. A new perspective on the issue evolved but it was a slow process in which politicians and the construction industry in the 1970s still considered old built environments to be of little value. Nevertheless new conceptions like cautious reconstruction and cautious city renewal came in use in universities and among architects (Caldenby 1998).

These issues were discussed on the European level, and great manifestations like the congress in Amsterdam took place in 1975. Conservation was connected to environmental preservation and cultural survival. The historic continuity of the built environment was seen as a human right. The Granada 3.X.1985 Convention, which was based on principles discussed in Amsterdam, passed in the European Council in 1985. The member states committed to take action on legislation, public

supervision, planning, education and research on conservation, protection and maintenance of the built heritage. Sweden signed on. Within a few years this resulted in new laws. A new view of built heritage and conservation was formulated. From a societal viewpoint care for our built heritage should, and must, permeate all sectors of society and be seen and handled as an integrated part of the regular planning in society (Robertsson 2002). Today preservation of built heritage is performed on the buildings' terms making use of integrated conservation.

The second is the Florence 20.X.2000 Convention which came into force in 2004 and which Sweden signed in 2011. This European Landscape convention states '… that the landscape has an important public interest role in the cultural, ecological, environmental and social fields, and constitutes a resource favourable to economic activity and whose protection, management and planning can contribute to job creation'. The landscape contributes to the formation of local cultures and is a basic component of the European natural and cultural heritage, contributing to human well being. Furthermore, the landscape is an important part of the quality of life for people everywhere: in urban areas and in the countryside, in degraded areas as well as in areas of high quality, in areas recognised as being of outstanding beauty as well as 'everyday' or degraded landscapes. The content of the convention should be adopted into the framework of national policies. The national landscape policies should view the territory as a whole and no longer just identify places to be protected. It should also emphasise the role of identification, description and assessment for knowledge production. Public participation and quality objectives are important parts of the convention and the Committee of Ministers guidelines for the implementation of the European Landscape Convention as well as special education on protection, management and planning of landscapes. In Sweden certain landscapes are identified out in the Environmental Code, *Miljöbalken SFS 1998:808*, and the Swedish Planning and Building Act, *PBL 2010:900* contains requirements for comprehensive planning with public participation even though the plans themselves are not legally binding and do not apply to legal context. Degree programmes at Blekinge Institute of Technology, BTH, and the Swedish University of Agricultural Sciences, SLU, are specifically focused on planning of landscapes and physical environments. None of the conventions is legally binding like the directives are.

9.3 Architectural quality and promotion of a good life, unit 3

9.3.1 Defining architectural qualities

Promoting a good life and wellbeing is one of architecture's main tasks, and this can be shaped in many forms depending on the client's needs. Successful collaboration between architect and client was discussed in Workshop V, along with architectural quality and how to analyse and assess architectural quality. The discussion is summarised in chapter 14. Most people prefer a varied and diverse built environment to a monotonous one, which is also stated by environmental psychologists (Küller 1991; Tucker Cross & Küller 2003). People need a rich and stimulating architecture with a strong *gestalt* (form, character) for their wellbeing. When discussing renewal of our cities' periphery, built in the latter part of the 1900s, variation seems to be a key issue. In a report from Boverket (2010a) on social and sustainable urban development, variation is one of five themes and includes urbanity as a positive notion with a variety of environments for living and activities, like workplaces, different forms of housing with different ownership categories, meeting places and a variation of services etc. The report also sees design variations in the built environment as something desirable. The ideal, according to the text, is the city around the year 1900. It seems that the bustling inner city with its diversity, complexity and vitality could serve, to some extent, as a model, even for changes in large-scale suburban districts.

The *Older, Smaller, Better* study published by National Trust for Historic Preservation (2014) demonstrates the unique and valuable role that older, smaller buildings play in the development of sustainable cities. The report provides a complete empirical validation of Jane Jacobs´ long-respected, but largely untested hypothesis: that neighborhoods containing a mix of older, smaller buildings of diverse age support greater levels of positive economic and social activity than areas dominated by newer, larger buildings. The research team empirically documented the age, diversity of age, and scale of buildings and statistically assessed the relationships between these characteristics and 40 economic, social, cultural, and environmental performance metrics. Analysis of data from three major American cities shows that districts consisting of smaller, older and mixed-vintage buildings support a greater density of residents, businesses, jobs, and creative jobs per square foot than newer areas.

Architecture is a design for culture, a place for human life as well as a form of culture, a symbolic expression for human life (Caldenby & Waldén 1986). Our built environment is a condition for the social environment and our common history is part of it. 'The city consists of relationships between the measurements of its space and the events of its past' to quote Calvino (1974). Preserving the different time layers ensures diversity and the meaning or soul of a place, the 'genius loci' (Norberg-Schulz 1980). Moreover, engaging people when a built environment is transformed for new needs is an important process that must be carried out in our work even though it takes time. The latter point is also stated in the Swedish Planning and Building Act, *Plan och bygglagen SFS 2010:900*.

Our physical environment should have proportions that we humans can perceive as pleasant. It should be built of materials which are pleasant to look at and to touch in addition to being functional. Our built environment must be possible to maintain, and with the passage of time have a certain patina. Our common space should be designed to promote social life. This is essentially consistent with the text in the Swedish Planning and Building Act.

9.3.2 The future - Vision for Sweden 2025

The Swedish National Board of Housing, Building and Planning, *Boverket*, has instructions from the government to promote good architecture and efficient design of the built environment. The Board has a great responsibility for the regulatory work but has also been commissioned to develop a vision for the year 2025 (Boverket 2012). It is composed of four mega trends: a changed climate and a world that is globalised, urbanised and digitalised. It shows twelve views of Sweden's future, and is written in Swedish. Only some of the parts concerning the built environment and architecture will be summarised here. In brief all construction in 2025 is made with a focus on people's needs for quality of life, good health and good management of resources and energy, and adaptable for changing needs. Materials are recycled and architectural, aesthetic, and historical values are included as core ingredients in all construction work. The overall goals for policy within the field of architecture and design are that it should be given favourable conditions for development; aspects of quality and aesthetic aspects should not be subject to short-term economic considerations and the interest should be strengthened and broadened; and cultural, historic and aesthetic values in existing environments should be protected and enhanced.

Every year our housing stock increases only by one %, so the buildings we mainly have to work with are the existing ones. The vision says that our cities will grow in density but with consideration and by a well thought out urban idea of sustainability, diversity and mixed uses, and in collaboration with the residents. Good planning takes time and needs to take time. The environment that we create will be part of our lives for a long time, and new buildings must for example fit in with the existing buildings and structures. Mistakes are hard to correct when large investments in buildings and

infrastructure have been made, and great values may be lost when changes are made in haste. In 2025 a lifecycle perspective is emphasised and energy efficiency measures and alterations are made with great attention to good indoor environment and accessibility and to the buildings' and their environments' qualities and historic values. In this way interventions are minimized, the different values are taken advantage of and deficiencies are corrected. Architectural and aesthetic qualities and access to cultural values also affect people's wellbeing positively.

Creativity, diversity and artistic quality should inform society's development. To reach the objectives, cultural policy should promote a vibrant cultural heritage that is preserved, used and developed. In Sweden we have become known for protecting our natural and cultural environments, but they also have great potential for development. Tourism industry in Sweden has become one of our most important industries with a major export value, higher than the iron and steel industry, and almost as much as iron, steel and timber export together.

Comment: When reading these selected parts of the vision for Sweden 2025, the future undeniably looks bright for our existing built environment, and increased collaboration between the heritage sector and the tourism sector seems to be expected. However, the most important with the vision for Sweden 2025 is the knowledge that every great project ever realised started with a vision.

10 Legislations

The decision to take a closer look at the legislative framework, unit 4 in the case study, was a direct outcome of workshop V. The study of documents reveals society's approach to energy issues in general.

10.1 What does legislation require concerning preservation?

10.1.1 Heritage Conservation Act

The Heritage Conservation Act, *KML, Kulturmiljölagen, SFS 1988:950*, concerns the protection of buildings and monuments, ancient remains, archaeological finds, ecclesiastical monuments and specified artefacts. The Regulation for National Monuments, *Förordningen om statliga byggnadsminnen, FSBM, SFS 2013:558*, concerns the formal protection care and maintenance of national monuments and restrictions on how they may be altered. There are about 300 national monuments in Sweden today managed by the National Property Board of Sweden, *SFV, Statens Fastighetsverk*. The National Heritage Board, *RAÄ, Riksantikvarieämbetet*, has been given the responsibility for content and edition of the two latter regulations.

10.1.2 Environmental Code

There is also the Swedish Environmental Code, *Miljöbalken SFS 1998:808*, with alterations up to *2014:901*, which among other things concerns valuable natural and cultural physical environments and areas which should be protected and preserved.

10.1.3 Planning and Building Act

The Planning and Building Act, *PBL, Plan- och bygglagen, SFS 2010:900*, is decided by the Swedish Parliament. PBL has special paragraphs and sections for historic and cultural values in our built environment in chapter 8, stating that cultural and historically valuable buildings may not be distorted, PBL 8:13, and that maintenance and alteration require caution and must be adjusted to the buildings' cultural and historic values. There are also general demands on buildings in 8:1 'A building shall be appropriate for its purpose and have a good design, colour and material effect' and in 8:9 '…a site that is to be built on shall be settled in a suitable manner with regard to the townscape or the landscape and the natural and cultural values at the site'. The Planning and Building Act always applies to both exterior and interior, even when a building permit is not required. The property owner is responsible for enforcing the law.

A building shall be kept in proper order and maintained so that its design and technical properties are preserved. The maintenance shall be adjusted to the character of its surroundings and the building's value from a historical, cultural, environmental and artistic viewpoint. If the building is especially valuable from a historical, cultural, environmental or artistic viewpoint it shall be so maintained that the distinctive characters are preserved, PBL 8:14. Furthermore, alterations to a building and moving of a building shall be made cautiously, with regard to the building's characteristic features and with its constructional, historical, cultural, environmental and artistic values sustained, PBL 8:17. There is also the Planning and Building Decree, *Plan- och byggförordningen, PBF, SFS 2011:338* which is somewhat more detailed than PBL.

10.1.4 Mandatory provisions

The Swedish National Board of Housing, Building and Planning, *Boverket*, is responsible for developing design and issuing mandatory provisions and general recommendations, such as Building Regulations, *Boverkets byggregler, BBR, BFS 2011:6*. The mandatory provisions are defined as

functional requirements referring to standards when applicable, and follow the PBL and PBF. There are also general recommendations in BBR, but they do not apply in a legal context.

10.1.5 Control of cultural values

Boverket's mandatory provisions and general recommendations about requirements for certification of competence for control of cultural values *BFS 2011:15 KUL 2*, comprises theoretical knowledge, and knowledge on legislation, and practical experience. There are two levels, normal and qualified, and the requirements are very high, including higher education requirements such as conservation officer, architect or civil engineer, and the two latter must be complemented with an education in building conservation. The practical experience should also be certified by regional authorities. This applies for all who want to have the certificate.

10.1.6 Environmental Objectives

The Swedish Parliament, *Riksdagen*, has set a number of Environmental Objectives to be reached within one generation. Boverket is responsible for the Environmental Quality Objective: Good Built Environment. In more detail the objective outlines a long list of qualities to be reached, ranging from architectural qualities and cultural heritage preservation to a sustainable urban structure in terms of resource conservation, freedom from noise, healthy local climate, good quality public transport, waste recycling and unspoilt nature.

10.1.7 Administration and practice

The regulatory framework is easier to follow if one has knowledge about the building tradition and cultural historic values, or can engage someone with such knowledge. Most people seem to be proud of their history and the built cultural heritage should according to the cultural policy objectives be preserved, used and developed. The National Heritage Board has the responsibility for meeting the objectives by knowledge building, for development of method and for follow-up, and the different County Boards manage these matters on the regional level. The municipalities sometimes have the conservation expertise within their own administrations but more often they involve an external organisation, the local or regional museum or conservation consultants when needed such as when handling a building permit and the building is listed or included in an inventory. If the owner is in a position in which he or she wants the building demolished or is planning a new business with activities that are not suitable for the building there can be a problem, and the parties involved must discuss to find a solution.

10.1.8 Non-governmental organisations

Within the heritage sector there are also non-governmental organisations, NGO's active on the international level and the International Council of Monuments and Sites, ICOMOS, has strong roots in national operations. This organisation is mostly known for its administration of World Heritage Sites but deals with a wide range of issues in their scientific committees such as work with the international charters and doctrinal texts.

10.2 What does legislation require concerning energy efficiency?

10.2.1 Environmental Code

The Swedish Environmental Code, *Miljöbalken SFS 1998:808*, with alterations up to *2014:901*, concerns both societal and individual requirements. Chapter 2 section 3 has a direct impact on how to choose an energy source and the technique for use. Persons who pursue an activity or take a measure, or intend to do so, shall implement protective measures, comply with restrictions and take any other precautions that are necessary in order to prevent, hinder or combat damage or detriment to human

health or the environment as a result of the activity or measure. For the same reason, the best possible technology shall be used in connection with professional activities.

10.2.2 Planning and Building Act

The Planning and Building Act, *Plan- och bygglagen, PBL, SFS 2010:900*, and the Planning and Building Decree, *Plan- och byggförordningen, PBF, SFS 2011:338*, apart from prescribing protection for built heritage, state that all buildings and structures should be energy efficient.

10.2.3 Mandatory Provisions

The Building Regulations, *Boverkets byggregler, BBR, BFS 2011:6*, which follows PBL and PBF have a whole chapter 9, concerning energy management. The table 10.1 and 10.2 below show that contemporary building and planning legislation places demands on a building´s energy efficiency, and the same energy performance is required of existing buildings when preserved, restored, refurbished or extended, as for new constructions.

Climate zone	I	II	III
The buildings specific energy use [kWh per m^2 A_{temp} and year]	130	110	90
Average heat transfer coefficient, [W/m^2 K]	0.40	0.40	0.40

Table 10.1 is the same as table 9:2a Housing with other heating than electric heaters in BBR 21, BFS 2011:6 with amendments up to 2013:14.

Construction part	U-values [W/m^2 K]
U roof	0.13
U wall	0.18
U floor	0.15
U windows	1.2
U entrance door	1.2

Table 10.2 is the same as table 9:92 Envelope in BBR 21, BFS 2011:6 with amendments up to 2013:14. If the building after alteration does not meet the demands in section 9:2 it should after alteration have pursued the following U-values.

10.2.4 Energy Performance of Buildings

One of Boverket's tasks in the field of construction is the harmonisation and implementation of EU Directives in Sweden, such as the *Directive 2010/31/EU on Energy Performance of Buildings*, implemented in the law *SFS 2006:985* with alterations up to *SFS 2013:773*, and regulation *SFS 2006:1592* with alterations up to *SFS 2013:1163*, and further into *BFS 2007:4 - BED 1* with alterations up to *BFS 2013:16 - BED 6*, which concerns mandatory provisions and general recommendations. The declaration should contain economically viable proposals for energy efficiency actions. The overall purpose of energy performance certification of buildings is to be economical with energy and to promote sustainable development. On an individual level it provides recommendations for cost-effective improvement measures and notifies of important examinations like ventilation and radon and will contribute to the well being of the building and its residents. It also provides reference values for comparison with similar buildings.

10.2.5 Control of Energy Performance

There is also *BFS 2007:5 – CEX 1* with alterations up to *BFS 2013:17 – CEX 4* which are mandatory provisions and general recommendations, but about requirements for certification of energy experts performing the energy declarations. There are two levels, normal and qualified, but no specific degrees or courses are suggested in the text. Instead there is a very long list of what an individual should have knowledge about, and what experience is demanded for becoming a certified energy expert. The applicant's suitability for the task shall be supported by documentary evidence by an employer or equivalent person. This applies for all applicants.

10.2.6 Environmental Objectives

Many of the Environmental Objectives are related to energy issues and the responsibility for meeting the objectives and follow-up is shared between the Swedish Energy Agency, the Swedish National Board of Housing, Building and Planning, and the Swedish Environmental Protection Agency. On the regional level the different County Boards manage the issues and have adapted the objectives to regional conditions.

10.2.7 Municipal level

On the municipal level there is a requirement that every municipality should have a plan for energy supply, distribution and consumption that is monitored and updated regularly, according to the Act on Municipal Energy Planning, *Lag om kommunal energiplanering SFS 1977:439,* and the Municipal Energy Planning Ordinance, *Förordningen om kommunal energiplanering SFS 1977:440.* A municipality sometimes has the necessary competence within its own administration, but often compliance requires an external organisation or consultants. All 290 Swedish municipalities also have energy and climate advisors who help private persons, as well as companies and industries with energy efficiency matters.

The Swedish Act on Municipal Energy Planning and the energy and climate advisors are very good initiatives, but there are no equivalents to this in terms of the cultural environment.

When interviewing the municipal officials, in Phase 1 which is described in Norrström (2011), about how building permits for cultural and historically interesting buildings were handled they all answered that there were too many laws and regulations to attend and they did not have the competence to assess the consequences of the alterations properly. There are fewer regulations now, which should make the administration easier, but according to the 2013 the follow-up of the Environmental Objective Good built environment, there are only 28 municipalities that have fulltime conservation expertise in house and only 29 % in total of the municipalities have it part-time or engage the competent consultants when needed. The low availability of conservation expertise over the years has remained relatively constant. For a long-term sustainable management of the built environment and its historic values to be achieved, the availability of conservation skills needs to be increased. This is one comment in the follow-up, which is available at the Swedish Environmental Agency's, Naturvårdsverket, website. A supplementary question must be asked: why do 71 % of the municipalities not fulfill the need for this expertise?

10.2.8 National policy

Back in March 2009, as a step in developing the climate and energy policy and meeting the required emission targets, the Swedish government presented A Cohesive Climate and Energy Policy, *En sammanhållen klimat- och energipolitik – Klimat* and *Energi*, Government Bills, *Propositionerna* 2008/09:162 and 2008/09:163, which were adopted by the parliament, *Riksdagen*, in the summer of 2009.

By 2020, the percentage of renewable energy is to be at least 50 % of total energy consumption. In the same year, the percentage of renewable energy consumed in the transport sector is to be at least 10 %. Greenhouse gas emissions in Sweden in 2020 should be 40 % lower than in 1990. The 29 target, *Directive 2006/32/EC* (now replaced by *2012/27/EU*) will lead to a reduction in energy intensity expressed in terms of energy consumption in relation to GDP of 20 % by 2020 compared with 2008. This text comes from 'The Swedish Reform Programme for Growth and Jobs – Annual Progress Report 2009' from the Prime Minister's Office.

10.2.9 Consequences of legislation for cultural and historic buildings

The ability to achieve these energy goals is limited to historically interesting buildings. One of the project within Save and Preserve is *Potential and policies for energy efficiency in Swedish historic buildings* (Broström et al 2014) investigating the interdependency between political energy targets and effects on the built heritage. They have developed an iterative and interactive method for assessing the potential and consequences of energy measures. Key elements in their method are categorisation of the building stock, identifying targets, assessment of measures, and life cycle cost optimisation. A case studied shows that to reach the national energy targets in this common type of historic building it is necessary to insulate the exterior façade and make alterations to the windows, among other measures, which in turn is in conflict with the target for preservation of cultural and historic values. On the other hand a reduction of greenhouse gases by 20 % in accordance with the *Directive 2012/27/EU* and the Swedish Government Bill *Proposition 2008/09:162* and *2008/09:163*, is possible without visible changes of the exterior façade.

The three objects within the EEPOCH case study have not been able to meet the energy requirements either, and the results are summarised in chapter 4, 5 and 6. So how are we going to balance the historic and architectural values with the new energy requirements in our built heritage? How will the buildings be administered when they need to be preserved, restored or refurbished, and when applying for building permit? Considering the development of legislation and its imbalance concerning energy use and cultural and historic values, the lack of expertise in the municipalities, the new inventory of our built heritage in Halland, and the number of inventories yet to be performed, one can discern a gap and also a worrying inconsistency.

11 Management and the team's work

11.1 Additional analysis of the collaboration, unit 5

The successful teamwork and organisation within the Halland Model were developed during many years with constant efforts for improvement, and resulted altogether in an efficient and responsible performance. The accomplishments and results concluded in Phase 1 have guided the orientation in Phase 2. The issue in Phase 2 was how to make use of the information and key conclusions summarised in chapter 9. The answer was to make an analysis for organising and structuring the information and conclusions made in Phase 1. The additional analysis below has been performed in Phase 2. The aim of the analysis was to form a structure to build on for conceptualisation of the working model and supporting methods.

11.1.1 Structuring information

This is a qualitative analysis to identify properties and meanings. The inductively generated hypothesis for what caused the success is the above description of the conclusions drawn. These conclusions could very roughly be categorised and divided into four strategies:

- an overall horizontal organisation
- the choice of democratic, dynamic and transformational leadership and management
- transparent organisation, creating good working climate and communication
- a learning organisation

eight tactics:

- the creation of a 'exclusive inclusiveness´ that gets everybody involved
- task-oriented teams for managing the differences between professional cultures
- inviting personal initiatives for further improvements
- to let one vision permeate the team and organisation as a whole
- information for all and clearly defined responsibilities
- making the participants share responsibilities
- arranging meetings where all are invited
- creating good working climate and communication

means for tactics:

- prioritising *quality* in performance, materials and in details
- emphasising the individual work's importance for the overall achievement
- to encourage the participants to share responsibilities
- good working climate and communication

and outcomes:

- trying to reach consensus
- respect for other professions
- pride over achieved results
- discussions of opposing proposals leading to good results, and further ahead than if not discussed
- good working climate and communication

However, the *relations* between strategies, tactics, means for tactics and outcomes transform them into something else, something that cannot easily be placed in a table. A tactic serving a strategy can be experienced as a strategy in relation to means and outcomes. Furthermore a tactic can serve more than one strategy, and means for tactics can serve many tactics. The *notions are multifunctional* – for example communication which can be both part of a strategy and a tactic as well as means and an

outcome. To have a vision for an organisation can be part of a strategy, and letting this vision permeate the organisation is a tactic, and if the vision is used for uniting people in the organisation it is a means for a tactic. The outcomes, in turn, depend on and can be results of more than one strategy, and many tactics and means for tactics. These facts show one reason for the need for non-linear systemic thinking when working with people in organisations and teams. The table 11.1 below shows only one single possible line of relations in the *vast web of possible relations*.

Strategy	**Tactics serving the strategys**	**Means for tactics**	**Means serving means for tactics**	**Outcomes**
– An overall horizontal organisation	– Choice of a democratic, dynamic and transformational leadership/management	– A transparent organisation – A learning organisation – Making everyone engaged and involved	– Emphasising the individual work's importance for the overall achievement – Encouraging people to share responsibilities – Meetings where all are invited	– High quality in delivered craft and in objects – A good working climate and communication – Pride over achieved results

Table 11.1 shows one single possible line of relations in the vast web of possible relations.

11.1.2 Analysis

So how could one organise these conclusions? Where is the structure, and are all conclusions desirable? To make it easier to manage some reductions can be made using systems thinking in the analysis. Upon a closer examination, the first strategies seem somewhat contradictory. A completely democratic management in a horizontal organisation cannot be a matter for one leadership. It should be about collaboration on equal terms, a joint management. The creation of an 'exclusive inclusiveness' always implies that something else is excluded, which may be unfortunate. To let one vision or idea, permeate the team and organisation as a whole gives associations to universalism. This in itself is not negative, but somehow in this particular context it contradicts the autonomy and the emphasising of the individuals' roles and importance. Trying to reach consensus is demanding, but when it actually works it is good, and as long as a fair discussion about opposing proposals leading to good results is valued as highly as consensus, there are two options.

To help manage the remaining strategies and tactics for development they can be seen as aspects or functions. The number of aspects/functions could thus be further reduced by generalisation, merging the ones with similar meaning together, and by identifying the aspects that mediate between the main aspects, the main relations are discerned. By structuring the other aspects/functions and other relations based on similar meanings, mediating aspects emerge and can be formulated. The obvious mediating aspects are *communication* and *transparency* but also *equality* connected to the democratic and horizontal organisation. A fourth mediating aspect, necessary for communication and transparency, is *understanding*, without which the other three would have little effect, and without which the respect for the other professions´ skills would be more or less impossible.

11.1.3 Conclusions

The core aspects or functions would then be communication, understanding, equality and transparency, which define a core connected to all the other aspects. This kind of reductive analysis, generalising, and identification of relational patterns discerned in the interview material facilitates a more clear and manageable description of the structural basis for the model and methods. After structuring, the basis could then be described as follows.

Horizontal collaborative management requires shared responsibilities (equality). It should be based on transparency, which includes meetings and information open for all, and clarity in all aspects of communication, such as the methods used, arguments for proposals and their consequences (transparency, communication). The dynamic and transformational aspects connect with the learning part of the organisation, encouraging each other's initiatives and also suggestions for improvements (equality, communication and understanding). Communication, understanding and respect for another´s profession is the basis for managing the difference between professional cultures (equality, communication, transparency and understanding). Teams are always task oriented which directs the communication, and are dependent on all individual members to be professional and deliver high quality performance (equality and communication). Altogether this would give a good working climate (equality, communication, transparency and understanding) in which the individuals are important, and it is *a structure to build on* for a model with methods resulting in consensus or discussion. This is the way the structure for the design of the balancing model emerged from the hypothesis and conclusions drawn within the case study.

11.1.4 Basic structure for the working model and methods

A theory building and development of useful methods could entail all aspects discussed above; the strategies, tactics and so on. Lessons can be learnt from the development of the trading zone (Gustafsson 2009) defined as an *active arena for negotiations* and a field of force corresponding to all actors' policies, values, facts and resources. Can a similar, but smaller, active arena be created for the professions working with energy and preservation issues in the built environment? It is theoretically possible and also referred to by Muñoz Viñas (2011) and by Svahn-Garreau in Workshop V where she presented the trading zone to which all concerned users are invited and their perspectives acknowledged which is the common method in the United States. It should preferably be established early in the planning phase because collaboration is a *socio-cultural activity* that must start early in a process if it is to work throughout. The question about user participation, however, is in this instance for the owner to decide after the professional valuations have been carried out. Professionals have different prior knowledge, training, responsibility and experiences than laymen, and the outcome of their work differs in a fundamental way. The very first assessment of the building´s status and possible proposals for measures should be made by professionals.

The core of the model is the balancing. This is not only about proposing balanced actions, but will be to map and understand the relation between the arguments for proposed actions and the consequences of their performance for the building and its users. This is what should be balanced and needs a clear and firm structure to give an overview. There should also be a set of methods for supporting this work based on the professions´ valuations. They shall support the individual position and valuation, but also the social interaction and collaboration. For defining or finding the theories supporting the core conclusion of collaborative management, the four mediating relational aspects of communication, understanding, equality and transparency will guide in the design of the working model and methods.

12 Disciplinary conditions and design of the working model

As concluded in Phase 1: Understanding of the involved professions' specific skills and disciplinary matrix or doxa is important for exploring possible designs for models of cooperation. One of the aims with addressing both academia and practice has been to explore how theory can be of use for practice, in practice. The matter has been extrinsic and outspoken at some of the workshops, but also discussed indirectly by the methods, practices and projects presented. Curiosity has been aroused, to find out the underlying theoretical framework to the methods and ways of thinking which have emerged at the workshops. A natural consequence has been to explore the literature for better understanding of what has been lectured and discussed, and for expressing what has been experienced at the workshops. These circumstances have also led to development of the content in this chapter about disciplinary conditions and the following chapter about the professions´ methods as being highly influencing factors on designing a working model that could be accepted by all three professions.

12.1 Paradigms

In a Kuhnian sense (2012) this research is performed within what he called the pre-paradigmatic social sciences. For C. P. Snow these social sciences represented a mediating third party in the 'war of sciences'. His *Two cultures* (1964), originally the Rede Lecture held 1959 and published that year, is a time document of an era in which technology and natural sciences were overestimated and believed to solve any problems, even global political issues, and an era with an economic view that seems naïve today. Science with a capital S in the 1960s also represented the 'reduction of human experience to the quantifiable, the measureable, the manageable' as Collini writes in the introduction to Snow´s book. Today we know that diversity and a variety of knowledge and disciplines are needed to encompass human life and science.

Simultaneously, Snow, by naming natural science (just science in English) and the Humanities as two poles, derived from Utilitarianism and Romanticism with two incomprehensible cultures, that could no longer communicate with each other, he pointed out the tendency toward increased specialisation. This narrative must be seen as the main contribution of the book and it gave rise to questioning the situation and evoked the need for collaboration between disciplines. In an additional text 'A second look' in the edition published in 1964 Snow was convinced that a third culture was coming, the social sciences, which would soften up the difficulties of communication.

One way of looking at the different cultures to gain an understanding of the similarities is to see that the process of concept formation in natural sciences as well as in the Humanities and social sciences has to be universal as well as abstract, not different in kind but in their subject matters. The two latter is only different in dealing with questions of value and motive in addition to logical relationships of cause and effect. At a meta-level it is a difference between the *nomothetic* and the *ideographic*, the universal and the particular which were discussed in workshop III, V and VI. The difference between the two also has to do with aim and method (Liedman 1998). While the nomothetic knowledge that natural science seeks, concerns universal laws and causality, the Humanities seek ideographic knowledge that aims at understanding the particular, irrational and concrete history with universal, abstract and rational concepts. Turning irrational reality to rational concepts does not simply imply mimesis of reality. Instead it is a transformation where the valuator, the valuations and the values are included. There are both 'subjective' value-judgements and 'objective' value-relations to account for. The former is unavoidable since value is attributed something by a valuating subject (von Wright 1993) and qualities in general cannot be quantified. The latter is formulated for built heritage in

international or European conventions, national legislation and also by what is held to be right and true within the professional stance and the disciplinary culture, matrix or doxa as for all professions.

Furthermore, today interdisciplinarity and also transdisciplinarity are new traditions within academia as a result of the development from Mode 1 to Mode 2 as described by Gibbons et al (1994). The three professions and their disciplines involved in the EEPOCH project are all characterised by being applied sciences to a certain extent and furthermore, the dualistic view separating theory and practice is hard to understand as the one cannot exist without the other – especially in architecture and design which belong to the Mode 2 paradigm of sciences. As Schön (2011) writes: doing and thinking are complementary and the dichotomy of thought and action is in-appropriate.

12.1.1 Mode 2

Knowledge production, scientific, social and cultural, in Mode 2 as described by Gibbons et al (1994) and Nowotny et al (2001) is the traditional mode in which architecture is developed. The very methods used in different design projects result in new transdisciplinary knowledge production. The notion of Mode 2 appeared in their book 1994, questioning the linearity and predictability of the research process in Mode 1, which is described as a stable traditional academic discourse. According to Nowotny et al (2003) the Mode 2 notion was seen as derived from Kuhn's shift of paradigms in *The Structure of Scientific Revolution* (2012) first published in 1962, but with a new twist.

Mode 2 has five characteristics, of which the first is that knowledge is generated within the context of application (Gibbons et al 1994) and later (Nowotny et al 2001) refined into different forms of conceptualisation, according to Nowotny et al (2003). Applied to the work described in this thesis, it would mean that what has come to light in discussions at workshops have been conceptualised into the working model and methods. The second is transdisciplinarity, in which the configuration of researchers and other participants keeps changing, constantly reconfiguring, giving rise to a transient working style. The knowledge is embodied in the expertise of individuals more than it is encoded in, for example, journal articles. This embodied knowledge has been made available to the EEPOCH project's participants through the workshops and interviews. Thirdly, the growing heterogeneity in the types of knowledge production due to open frontiers allows new kinds of knowledge organisations such as think tanks or management groups, accompanied by information technology that enables the process of societal distribution. The fourth characteristic of Mode 2 is that the research process is highly reflexive with multiple views instead of an ideal of a neutral view of an 'objective' investigation or reductionist interrogation. It is a dialogic process, a conversation between research actors and research subjects. The nine workshops carried out have enabled these multiple views which have taken into account when designing the working model and methods. On the organisational level of the research system, a distinct shift from a 'culture of autonomy' to a 'culture of accountability' has taken place, according to Nowotny et al (2003). The fifth characteristic concerns quality control. The authors claim that scientific peers can no longer be reliably identified due to a lack of stable taxonomy of codified disciplines from which peers can be drawn, which limits the peer review system. Reductionist forms of quality control are hard to apply to more broadly framed research questions because there are more players in the research 'game'. Scientific excellence remains an indispensible criterion, but economic, political, social, cultural and other criteria must be added. The authors claim that we must learn to live with multiple definitions of quality and with new ways of managing knowledge in the co-evolution of science and society. From this description it is understood that the design of the EEPOCH project and working model and methods are basically performed in a Mode 2 paradigm.

12.1.2 Linear systems thinking and non-linear systemic thinking

Although paradigm discourses are historically interesting these polarised worldviews must be left behind for a more practical or even pragmatic view. All paradigms and modes are important but their theoretical delimitations are not so clear-cut in practice. This has been demonstrated during the workshops. Both in individual work and in collaborative work the paradigms are mixed which is described in chapter 13´s study of the three professions: engineers, the conservation professions and architects. Collaborative methods can be promoted and developed by not accentuating the differences. Talking and writing too much about dissimilarities only cements the positions instead of bridging them.

A more appropriate description in practical sense, although simplified, is that the parts consisting of positivism, instrumental rationality, the natural sciences and technology, the laws of nature, causal problem solving, calculations and predictions can be expressed as systems thinking. The parts consisting of the humanities, social sciences, organisational work with people and roles, assessments of values, the culture and people's creation of artefacts, simply all that are related to us as human beings, can be expressed as systemic thinking. All professions make use of both linear systems thinking and non-linear systemic thinking in varying degrees depending on the research task or assignment.

Traditional talk about gaps and bridging gaps becomes obsolete in this context, when it no longer should or can be about 'either or' but instead 'both'. Both systems and systemic thinking are necessary and needed, but the emphasis alternates from one to the other depending on mission and context. The systems thinking and the systemic thinking are ways of dealing with the paradigm issue, which enables one to avoid falling into the 'paradigm-trap' of polarised discourses. All professions use both systems thinking and systemic thinking which is used for understanding and also as unifying traits. The following paragraphs describe the two ways of thinking.

In *Filosofilexikonet* (Lübcke ed. 1988) the notion system is defined as a collection of elements that are interconnected (dependent) and thereby provides a structured whole – an organised whole whose parts are interconnected by fixed rules, laws or principles. The system thought is crucial to the very idea of *science*, and does not consist of a continuous accumulation of knowledge. Science has through the history of philosophy had its objective in system, understood as *that which specifies the foundation*. Thinking in systems is now regarded in philosophy as a matter of systematising, classifying procedures. Systems theory or *general systems theory* is defined as a theoretical attempt to formulate general laws for systems, whether they are physical, biological or social (NE).

Systems theory developed from studies in mathematics, physics, chemistry, medicine and biology by engineers has had great importance in these disciplines, but also generated different approaches within organisational theory. In a systems theory perspective of organisation, equilibrium and exchange are emphasised, according to Larsson and Kallenberg (2006), but simultaneously attention is paid to the exchange over an organisations´ boundaries, which depends on the organisations´ adaptation to its surrounding environment. Examples of systems theory thoughts can be found in human resource theory, symbolic theory and in theories about learning organisations.

From the 1950s till today systems thinking has been transferred to the social sciences and is prominent in commercial and industrial organisations, in management and leadership, planning, budgeting, performance analysis, quality systems etc. according to Stacey (2013). He writes about management and the danger of running systems thinking too far in organisations with people. Referring to Kant (1914) as the one who introduced systems thought the way it still is used, he states that the notion *system* is a hypothesis. If man would be only a part of a system her autonomy would

be denied. It is a matter of free will with all the responsibility that entails. Stacey (2013) favours a direction away from systems thinking towards a complex responsive process perspective, which is about confirmation and social interaction. Organisations have technical systems, supervisory systems and monitoring systems etc. and processing tools for these, but organisations are not systems seen from a complex reactive process perspective: rather they are on-going, iterative patterns of human relations. Organisations are processes over time that include conflicts and negotiations in everyday, ordinary local situations, and both responsive reaction and interaction are needed to let people continue working together.

Nilsson (2013) asserts that system thinking is not intended for human or social phenomena. He argues that we have many times in practice seen the deficiencies in systems thinking, particularly where detailed predictions involving human beings have been tried, when the analogue and linear causality is not sufficient. The moment people's different experiences and wills enter the systems, complexity occurs. The ideal strategy for problem solving must then be replaced by an open dynamic strategy based on possibilities – a systemic thinking. The affirmative view on complexity is set against a reductionist approach. Furthermore, the complexity perspective presupposes an involving approach on all levels in an organisation (Nilsson 2013).

Complex processes thus occur when people are involved. These consist of time and identity, which are based on human perception, interpretation and action (Nilsson 2013). In non-linear interactions, bifurcations exist within the situation. This always implies choices, leading to the possibility of multiple futures and surprising responses. There is no ambition to find optimised configurations, but rather transformative changes creating new contexts (Allen 2000). Complex networks of creative individuals are reacting and adopting dynamically, creating their own social environment. When treating teams as complex phenomena, human behaviour and interaction need to be taken into account. To navigate in the complexity of human actions, human design is needed.

12.2 Architectural design

Reflecting over the different disciplins and professions also brought thoughts on how the design disciplins like architecture actually work and how it can be described. Architecture is structures organising the physical world and inviting to events and developments. The materially created becomes architecture when something happens, when something *takes place*. As was stated in Workshop III 'architecture must be experienced to be perceived as architecture'. There is a connection to function, which consequently leads to empathy and the ability to imagine how things will work and for whom. Architecture is thus both technical and social using both systems thinking and systemic thinking in the work of design.

Architecture organises reality to make it manageable and understandable, and in some situations more active work and more reflection about our way of thinking is needed as was the situation within the EEPOCH project and the design of a working model. To organise is always to organise thought – to structure the surrounding world and organise it in a legible way for the thought, according to Nilsson (2002), and this is a good description of the starting point for designing the working model. Philosophical images, systems, models and strategies of thought become an aid for the organising and reading, the interpreting of reality. Referring to sciences studying relations of cause and effect, to art forms that compose and to philosophy assembling concepts in consistent plans or systems Nilsson asserts that architecture is located at the crossroads of all these, and perhaps more notions.

Nilsson has made an in-depth study of Deleuze's thinking and its relation to architectural invention and architectural research. Some of the reflections and conclusions made in his *Konstruerandet av*

verkligheter. Gilles Deleuze, tänkande och arkitektur (2002) have been used for understanding of and for describing the individual design process leading to the working model and methods.

It is often demonstrated that architecture concerns wholeness, but Nilsson (2002) suggests that this holistic thinking rather is an ability to manage several different concepts simultaneously. In a discipline it is possible to refine ones thinking and draw the implications all the way with respect only to factors within the discipline. This is possible in architecture concerning specific methods, knowledge acquisition, analysis and all parts of architecture that are connected to systems thinking, but architecture is always related to reality – it is contextual and relational, and it is relational in multiple ways both conceptually and materially. Architecture is a web of relations – the relations between the building as an idea, as a structure, as a system, and as experienced reality for people, to mention few. It seems that architecture is not only located at a crossroad, but implies the crossing of a variety of aspects combined with architectur´s specific thinking in rooms, the spatial and 'designerly' aspects of length, width, depth, gestalt, time and event. New opportunities are generated with the architect's trained imagination and capacity to construct alternate realities.

Considering these aspects architecture is a floating, not static, subject matter. It is a practice as well as a science, deriving new knowledge from designing, organising and structuring the world, as well as from studying how the constructed world is used. Method is a way to transfer something. It is a relation between a conception and its possible consequences. Conceptualising is what architects do first; secondly architects design experience. Nilsson uses the notion nomadic, which in Bauman´s description (2000) is liberalistic and an elitist approach, and causes Nilsson to ask if Deleuze's and Guattari's subversive analyses and calls can provide a source of resistance in a situation where societal and economic processes fully embrace and utilise the subversive nomadic. He continues that Deleuze has stated that thinking is a way of making resistance, but that it must be a double resistance: both a resistance against chaos surrounding us and against an overly fixed and inhibitory order. It should be a resistance that simultaneously creates order and liberates, through organising in sufficiently open and transparent structures. This is in two ways analogous to the systems thinking and the systemic thinking used in this thesis: structurally and as an idea. Furthermore, Nilsson states that architecture must *sometimes* transgress boundaries, but *always* make it possible for the unpredictable, ever-changing, new connections, other structures, or other ways to work or to be. This could actually have been guidance for the design of the working model and methods. Nilsson concludes this part by mentioning the calls to rethink the ways of viewing the world and affect our situations, and that the reciprocal interplay between conception and action is fundamental – theory and practice have to develop in interaction, as always.

12.2.1 Conceptualisation

How could the relation between theory and practice be perceived and formulated? Describing the contents of the parts is one thing, but how does it work? Concepts within philosophy have inspired and been used by architects for development of architectural theory, which has been perceived both positively and negatively by philosophers. The following formulation by Deleuze and Guattari in *What is Philosophy?* (1994) is cited by Girard (1995) and concerns the relationship between philosophy and architectonics: '"*Philosophy is a constructivism, and constructivism has two qualitatively different complementary aspects: the creation of concepts and the laying out of a plane*." Thus [….] philosophy is the invention of concepts. Architects think that they are able to compete in the field of concept invention, but what does architecture invent? And in what way does it invent differently from science and from philosophy? In what way does its component of material presence determine the expression of its fictions? It would seem that architecture invents the other

way around: it begins by proposing the intelligible and then arrives at the real, whereas sciences and philosophy start from the real in order to produce the intelligible' (Girard 1995). Applied to the EEPOCH project, Phase 1 started from the real and Phase 2 by proposing the intelligible to arrive at the real.

Nilsson (2002) is also mentioning this passage and has many comments to this related to what knowledge and science is, but only some comments with bearing on this thesis are mentioned here. Girard's statement above would imply that architecture creates by working from the conceptual, the mentally imaginable, towards the real. It is about conceiving, constructing something intelligible in the 'thinking' that is an immaterial visibility in the work towards a constructed materially. To construct this intelligibility, notions and concepts are needed. This in turn would imply that science departs from a given form in reality to arrive at an immaterial constructed form. Science is trying to make a limited and specific part of reality intelligible in a greater whole, in a more general context. The chosen form is elusive and ambiguous and can be of both discursive and material nature, but working mainly towards an intelligible form that is unambiguous, comprehensible and reproducible.

Research is often distinguished from design by their different relations to context. Research is a way to ensure context-independent rules while design is a way to change the context. These views of thinking and working are contradictory and cannot be reconciled, but no thinking is that strict according to Nilsson (2002). All thinking - even scientific thinking – is impacted or affected by intuition, style, emotion and often involves tentative tests with provisional structures. An epistemology comprising all aspects of architecture as a discipline of both theory and practice does not seem to be possible, however, within this description, and that is why a doxology is interesting and also why Heynen (2012) practices and writes about 'designerly research'. A fundamental aspect of design as a discipline is its ability to create unity of contradictory and ambiguous elements. Design integrates opposing demands and transforms them into a unified whole according to Nilsson, which could consist of a conglomerate rather than of a synthesis of disparate variables. The wholeness is already there by the intelligible that architects depart from to arrive at the real, connecting to Girard's (1995) view. The figures and gestalts of spatial thinking provides different kinds of wholeness, possible to test and use as tools in efforts to grasp and analyse a complex situation, in theory or in practice, which also can lead to new theories and concepts (Nilsson 2002).

12.2.2 Rationality and mimesis in designerly research

Heynen (2012) expresses the issue from a somewhat more practical view. Referring to Adorno and his thought that it is characteristic of art that it endeavours to create a dialectical relationship between moments of cognition, mimesis and rationality, she describes rationality and mimesis as opposed to each other in a relationship that is paradoxical: the two moments of cognition cannot easily be reconciled. The work of art, therefore, is not able to resolve the contradiction by simply mediating between the two because they are incompatible. She continues that scientific research is often believed to be based upon objectivity and rationality, but in science things are not so clear-cut. Metaphors and models abound, and 'imaging' is a crucial point in developing new understandings of how the physical world works. For the discovery of deoxyribonucleic acid, DNA,for example, the image of the double helix structure proved to be a crucial element for understanding its construction and function.

From this Heynen (2012) concludes, 'One could claim that enhancing mimetical understandings of reality by relying on designerly ways of knowing can widen the range of research methodologies and thus provide an increasingly productive approach to research. Rather than condemning mimesis as utterly non-scientific, this mode of knowledge should be welcomed and embraced in order to enrich

the palette with which the human condition is investigated. Designerly research in architecture and urbanism thus complements other types of research (theoretical, historical, economic, social, etc.) and forms an integral aspect of the interdisciplinary and transdisciplinary strategies often necessitated by architectural and urban questions.'

12.2.3 Practice and theory

Architecture is an important part of society that is manifested in laws, decrees and regulations described in chapter 10, and special architectural educational programmes that are dedicated to the subject while being recognized as a natural part of other curricula. Comprising natural science, technology and the Humanities, architecture has a multidisciplinary character, but as a conceptualizing designerly discipline manifesting culture, and culture being created by people, architecture has a strong connection to social science. Architecture is created by people for people, as all sciences and practices are. In this contextual reality a pragmatic approach described in chapter 8 is appropriate or even necessary. According to Schön (2011) we may consider science as a process in which scientists grapple with uncertainties and display arts of inquiry akin to the uncertainties and arts of practice. Allen (2000) states that both theories and practices are produced by active, conscious subjects in specific situations, and theory is thus a practice in itself, a set of activities and procedures with a specific language and a known set of approaches.

There are yet more practical and pragmatic approaches to design. Sandin-Bülow (2013) writes about a growing specialisation that has made it harder to have an experience-based perception of value, quality and impact in the design process. A distance to knowledge and experience has occurred that makes it harder to assess quality, formulate demands and to influence constructively. She also argues that design must be seen as a function equivalent to economy, marketing, technique and production, and that collaboration is important. According to her practical view a designer is a generalist and the design process comprises both an analysis phase and a synthesis phase. Designers and architects are trained to shift between details and the whole, and clearly imagine what the finished product will look like. This inner vision serves as a role model and checkpoint during a project's implementation. Furthermore, design is a process in which industrial designers, architects, and other experts, in a product development or construction process creatively solve a functional and aesthetic problem. This is based on a holistic approach that includes the production, finance and marketing alignment. It is a method of working with design that impacts the whole development process, increasing the quality of the final result. Sustainable development is, according to Sandin-Bülow, to deliberately and thoughtfully manage and develop objects and environments, working in line with economic, ecological, social and cultural conditions.

A pragmatic approach is also appropriate in other contexts. Theories and concepts are tools for human thinking and when used to make reality graspable they are used the way a craftsman uses tools. Philosophy, art and science can make use of one another's concepts, but even when mixing concepts each discipline must always proceed with its own methods. Hermeneutics, for example, are sometimes said to concern only the past, that which already has been created and thus can be studied, but interpretation and understanding are among the tools architects and other professionals use for exploring the present where hermeneutic questions and methods can be used. Every analysis and interpretation is an active creation, according to Nilsson (2002) and also to Jeanrond (2003). Architecture produces understanding and knowledge in a transformative sense, be it artefacts or theories, and maybe it is the structuring ability that enables the architect to manage several different concepts simultaneously. Furthermore, architectural thinking has the capacity to manage uncertain,

changing and complex situations, and is an important tool in the investigation of cultural situations (Nilsson 2002; Heynen 2012).

The research in this thesis is performed within the design sciences where theories are developed in parallel. This thesis is a qualitative oriented study with the aim of changing the existing practice into a preferred alternative, or more exactly with the aim of providing alternatives. This thesis is not only to interpret knowledge into design: it is about conceptualising, for merging theory and practice.

12.1

Figure 12.1 Theory and practice are seemingly different, but they are not, which is illustrated by the Möbius-strip representing disciplinary and professional work.

In the organising and structuring of the world, and in studying how the constructed world is used, the architect has to study and define both the continuous variation of variables and the constants in the work. These include cultural and social variables as well as physical materials, technical aspects and functions, and systemic thinking and systems thinking. These have been the main concepts throughout Phase 1 and Phase 2.

12.2.4 Practical reflection-in-action

Donald Schön has studied the special form of thinking and knowing that practitioners of different professions use, architects among others. 'The situations of practice are not problems to be solved but problematic situations characterised by uncertainty, disorder, and indeterminacy' (Schön 2011) in which, according to Nilsson (2002), the practitioner has to manage conflicts between values, objectives, intentions and interests. Technical rationality has a tendency to ignore the formulation of a problem, the problem setting, when defining the choices, the objectives to be met, and the means for meeting them. In transforming a problematic situation to a problem the practitioner has to create meaning of and understanding of an uncertain situation that at first seems incomprehensible. 'Problem setting is a process in which, interactively, we *name* the things to which we will attend and *frame* the context in which we will attend to them' (Schön 2011). The formulation of the problem is in itself a design-problem, and by not adjusting and limiting it to existing categories and theories too early in the process the task can evolve and become both wider and more can be achieved than if captured early. Design is described by Schön as a reflective conversation with the situation. The designer shapes the situation in accordance with his or her initial appreciation of it, the situation 'talks back', and the designer responds to the situation´s back-talk. 'In a good process of design, this conversation with the situation is reflective. In answer to the situation's back-talk, the designer reflects-in-action on the construction of the problem, the strategies of action, or the model of the phenomena, which have been implicit in the moves' (Schön 2011). In each instance, the practitioners allow themselves to experience surprise, puzzlement, or confusion in a situation they find uncertain or unique. They reflect on the phenomenon before them, and on the prior understandings that have been implicit in their behaviour. They carry out an experiment which serves both a new understanding of the phenomena and a change in the situation. They become researchers. This

merging of thinking and doing is characteristic for reflective practitioners, just like the habit of seeing opportunities instead of threats in the uncertain and formulating possibilities rather than problems.

All professions ‘engaged in converting actual to preferred situations are concerned with design’ according to Schön (2011) and the designer more often creates a representation than the final product, which is constructed by others, be it a programme, a policy or plan, image or other. Design is about changing existing situations to desired ones– a projective activity transforming reality. This applies for architects as well as for the engineering and the conservation professions.

The professionals must also be aware of their differences in preferences, and a design process must take these differences under consideration, when developing models for communication and negotiation. The next chapter is about the three professions.

13 The three professions

Balancing energy efficiency and preservation demands in conservation is often considered to be a contradiction while quantity and quality are not compatible and difficult to compare. The theoreticians and practitioners in the three disciplines of engineering, conservation and architecture, also have different cultures or doxa within their professions. We have all experienced conflicts between different interests in our work. The main thing is the ability to focus on what we have in common and accept that there are dissimilarities, and that it can be enriching to understand other perspectives. In a way, referring to the previous chapter, one could say that engineers use the nomothetic, conservation officers the ideographic and the architects use their designerly way of thinking, but this is only how it appears to be. At a closer look all three professions make use of all three ways of thinking. The following are brief descriptions for an overview of the professions' work and methods.

13.1 Engineers

13.1.1 Development of education for the engineering professions

The formal Swedish education for engineers and architects had about the same development as the French (Mårtelius 2011). The father of Swedish mechanics or engineering was Christopher Polhem 1661–1751, and in 1697 he founded the *Laboratorium mechanicum* which was a collection of mechanical models for educational purpose. However, it was not until 1798 with the establishment of the School of Mechanics, *Mekaniska skolan*, that Sweden had a continuous technical education. In France the *École Polytechnique* had been founded 1794, and technical institutes appeared in other European cities. This development led to a Swedish initiative, and the Institute of Technology, *Teknologiska Institutet* was established and opened 1827 (Geijer 2004). The training was focused on mechanics and chemistry and still primarily practical. In 1877 the institute's name was altered to the Technical college, *Tekniska högskolan* (Geijer 2004), and later to the Royal Institute of Technology, *Kungliga Tekniska högskolan, KTH*, and it was at that time the school of architecture moved there (NE). The art of engineering had in many countries sprung from the military organisation where the engineer troops also had an architectural profile, and in Sweden and England also from mechanical industry and mining. Chalmers was established in 1829 in Gothenburg. Its official names have been: *Chalmerska slöjdskolan* 1829-82, *Chalmers tekniska läroanstalt* 1882-1914, *Chalmers tekniska institut* 1914-37, and *Chalmers tekniska högskola*, Chalmers University of Technology, from 1937 on. There are between 10 and 15 major engineering programmes in Sweden today from Luleå University of Technology in the North in Sweden with to LTH at Lund University in the South, but there are more than fifty universities of which several have various kinds of technical professional degree programmes (UKÄ).

13.1.2 The engineers' methods and procedures

When an engineer specialised on energy supply and use, is assigned a task he or she usually starts collecting data by asking a series of questions. Surveying the building's surfaces, especially façades, is necessary for defining the heat-losses through the envelope. What kind of construction is it? This has importance for the building's ability to store heat which determines if it is possible to heat less at night. The kind and amount of insulation must also be registered for the protocol. A closer look at the façade and the water-shedding features, such as gutters and downspouts can also identify exterior sources of moisture problems. It always takes more energy to heat a moisture damaged building to 20°C indoors than a dry one, and an inspection of the foundation is often carried out. What systems are installed for heating, cooling, hot water and ventilation? What condition are they in and what

energy sources do they use? Is there enough space for the mechanical systems? What are the figures for consumption? Metering information is important, and data on the buildings energy consumption gives an overall picture of a building´s status. Monitoring that data is a condition for running and maintaining an energy efficient building. Last but not least, do the building occupants experience a good indoor climate? Can the systems meet the users' demands? These are but a few questions that have to be answered in an initial phase.

The processing of empirical data with calculations etc. starts after the auditing. Measured figures do not always match the calculated ones. These differences could show that the building is maintained very well but could also indicate need for actions, and a trained engineer's interpretation and search for clues can also show what could be improved or what needs a deeper analysis. Detection and interpretation are necessary methods. From the data received a list of requirements is made including system requirements and a package of measures, and documents for procurement are prepared. Life cycle costs, LCC, are calculated and this is one important basis for decision. When all measures are decided on the detailed design is made for use in contracting and procurement, and a plan for verification is made. During the construction phase a quality plan and control of construction and functions are crucial for achieving a good result. Documentation of all actions, operations and controls are important not least for the evaluation, but also as a basis for the maintenance plan and operational routines as parts of a system manual. This is a very short and general description of an ordinary process with the planning or programming phase, design phase, construction phase and the monitoring and evaluation as a finish before delivering the completed project to the owner. This process applies for work in both new and existing buildings.

Engineers specialise in different areas and several are required for a single project. They all have their methods of working and tools for the various calculations needed. The software IDA ICE and VIP+ and BV2 are commonly used by engineers engaged in the energy field today, and HAM and Wüfi are examples on software for calculations of humidity and moisture in construction components. There is also a variety of software for operational control of the different systems. There is a plethora of books and reports about building technology, materials, mechanical systems, construction, humidity and moisture problems, ventilation etc. that describe methods for use in determining a buildings physical condition and for the planning and construction of new buildings. All this knowledge is an essential part of the work with existing buildings.

Engineers usually choose a field of interest and then narrow it down to a manageably sized topic for his or her research. Like most of the sciences, engineering is nomothetic, following the laws of nature, exploring cause and effect, and striving for the general. There are many principles and methods and there is a kind of both critical and realistic approach when choosing methods to match the case for research, and Chalmers (1999) addressing the natural science and technology, claims that there is *no scientific universal method* fit for all research. There are indeed many different ways to do research and formulate a hypothesis. What seems to be decisive is, whether a hypothesis generates predictable consequences. In research, a hypothesis can often be verified in the laboratory, but out in practice the predictable part is more complicated. There are few ways of testing new methods and materials and wrong decision can ruin a building and the economy for a project, but control systems are a little easier to test in practice. The practitioner has to rely on his or her own experience from practice and that of others, and to a great extent must use conventional methods. The important parts are that the solutions suggested for a project improves previous conditions, are environmentally friendly and sustainable, are cost effictive and energy efficient, and are suitable for the intended use and users.

13.2 Conservation officers and consultants

13.2.1 Development of education for the conservation professions

In Sweden the care for and conservation of royal castles and premises, and of churches started in the 17th century with special state offices held mainly by architects (Geijer 2004). It was during the 18th and 19th centuries that the idea of the historically specific formed and became doctrine. History was given a new understanding as a totality of processes and development where every detail was important for the whole, the high as well as the low, and within art the original genius was hailed (Liedman 1997). Winckelmann also wrote what is considered to be the first 'history of art' in the second half of the 18th century (Geijer 2004; Muñoz Viñas 2011) and Baumgarten formally created the philosophical aesthetics (Muñoz Viñas 2011). In this romantic and idealistic paradigm the conservation subject-matter was developed.

In Sweden during the 19th century the antiquarian education originally consisted of courses in art history, ethnology and archeology at the universities, and the workplaces were mostly at the museums (Geijer 2004). The development of the conservation professions is largely a phenomenon of the 20th century's demolitions of city centres. After demonstrations, ideological discussions on both Swedish and international levels, the first professional education of conservation officers in Sweden was established. It started in the University of Gothenburg 1978 under the leadership of Jan Rosvall and Nanne Engelbrektsson. An entire corps of conservation officers took their place in society´s planning at large, and they became an impacting factor in the physical planning. The university´s degree programme for conservators started in the 1980s. It now has laboratories in Mariestad, *Hantverkslaboratoriet*. A similar programme and development also occurred later in Visby, which is now connected to Uppsala University. These are the two degree programmes in Sweden.

3.2.2 The conservation professions' methods and procedures

The management phase in a historic building is a continuous process and the most important from a conservation perspective. Major interventions do not occur often in a historic building's lifecycle. The main work is performed on the basis of the maintenance programme, which is the main tool. It includes all reports, analysis, records etc. worked up by stages. A maintenance programme can consist of a status report; maintenance plan with scheduled maintenance routines; preventive action plan; registered damages with prioritised immediate, urgent and necessary repairs; documentation with drawings, photos, the legislation and material from archives; structural and technical analysis and much more. It is also the base for all interventions, and the preparatory investigation can be limited to the parts considered for intervention if the object is listed and properly documented.

If there is no programme and no inventories have been made in the area, the conservation consultant has to start from scratch, making a first inspection. Surveys of existing built heritage are always the starting point for the conservation professions when they are assigned to a new mission, or as Feilden (2003) describes it 'Legislation, listing and scheduling cultural property gives the framework and structure of conservation'. In the overall assessment of technical, material and structural conditions laser scanning is sometimes used today. The building's cultural and historic values are also assessed. The value analysis can consist of emotional values, cultural values and use values which Feilden (2003) recommends for understanding the significance of historic resource, but there is also Unnerbäck's handbook (2002) based on a building's document values and experienced values. The next step is the design phase. An analysis is made of the planned intervention's impact on or consequences for the documented values, which then are discussed for setting the objectives and ambition for the preservation and a quality plan is decided on. Inspections on the construction site are

regular, and all measures and actions are documented during the construction phase and all protocols from meetings are gathered. The material is used both for planning future maintenance, and for the conservation consultant's final report on the intervention.

The sense for detail, the critical mind and the methodical and thorough documentation that 19th century historians developed remains a living legacy in the traditionally descriptive disciplines. Exploring history in trying to find the particular, the unique, is ideographic (Liedman 1998). It is also about interpretation of the empirical material. The aim of the interpretation is either to find the synchronic – the unique event, person or place – or to discern the diachronic – the most important or useful patterns, for generalisation and understanding of a developing process, the connections, their relations and the context.

Just as in engineering today, conservation involves many different specialists. During the latter part of the 20th century the new field of scientific conservation was developed. Conservators used physics and material science in their laboratory experiments to find new ways of preserving built artefacts. Today many conservators are chemists who work with nomothetic research, following the laws of nature, and exploring cause and effect. Experiment, empiricism, controlled methods and quantifications became important parts of conservation. 'The advent of hard science in the conservation field has been one of the most important single factors in the development and shaping of the conservation profession' (Muñoz Viñas 2011). Working either as a conservation officer or a conservator, the subject of interest is always the empirical material whether it is a narratives about a historic site or a construction material like mortar.

Conservation has at the same time taken a new direction. Principles of reversibility, removability or retreatability and minimum of intervention have become the prevailing measures, but they are not imperative. Flexibility has become a keyword. There has been a shift from 'classic' restoration and its focus on the 'object's true appearance' to focusing on the 'subject' that is, the meaning, values and function an object has for the affected people. Leaving the 'classic' truth approach gives cause to inter-subjectivity, although this can be balanced by the sustainability approach. There is economic sustainability connected to tourism, and ecological sustainability in choice of materials and techniques for the preserving work in conservation. Sustainability can also be applied to the object's significance. In this sense sustainability is similar to reversibility or minimum of intervention, to taking future uses and users into account when decisions are made: for them to use or take part of the significance in the future (Muñoz Viñas 2011).

13.3 Architects

13.3.1 Development of education for the architectural professions

When the Stockholm Palace was constructed a school for decorators was established in 1735 (Geijer 2004), and the founders were Carl Gustaf Tessin and the architect Carl Hårleman. The French artist Guillaume Thomas Taraval was the teacher in this *Kongliga Ritarakademien* (Konstakademien; KKH). The vision was an academy after the French model for gathering artists and connoisseurs and in 1766 the name was changed to *Kongliga Målar- och bildhuggarakademien*. King Gustav III wrote the first statutes in the year 1773 and from then on architecture, graphics, anatomy, perspective and cultural history were integrated. Thus Sweden had its first school with a complete architectural education *(Svensk uppslagsbok*). The name was altered to Royal Swedish Academy of Fine Arts, *Kungliga Akademien för de fria konsterna,* in 1810 (Geijer 2004), but is usually called Academy of Arts, *Konstakademien,* which also included the Royal Institute of Ar,t *Kungliga Konsthögskolan.* Both men and women could be members of the Academy but it was not open to female students until 1864 (Österberg 1990). The division between architect and construction engineer was still not really

established, and tectonics included both engineering and style. The architect personified knowledge and skills from both engineering and architecture. In 1876 the school of architecture was integrated into the Institute of Technology. According to Sigurd Curman a course in architectural history and restoration started in 1912, which was then a completely new subject at the Royal Institute of Art (Riksarkivet). The course has continued at the Royal Institute of Art as an additional course to the School of Architecture at the Royal Institute of Technology, *KTH*, (KTH; KKH). There are also courses in preservation and alteration at Chalmers University of Technology. In 1961 a third university of technology was established in Lund, *LTH*, whith architectural and industrial design degree programmes. There is programme for landscape architects in Ultuna and Alnarp with roots in the 19th century, but the modern education started in 1977. In 1989 a degree programme for spatial planning of built environment started when Blekinge Institute of Technology, *BTH*, was established. In 2009 a fourth school of architecture was established at Umeå University.

13.3.2 The architects' methods and procedures

The architectural discipline is based on the art of making. Thus professionals constantly create and recreate not only artefacts but the methods adjusted to the task given. Nevertheless, some methods for assessing architecture are described in the literature, and there is literature about how architecture is perceived and experienced by users.

To start with, mapping is a necessary prerequisite. This should preferably be performed without limiting factors. One has to have a clear overview of the high level qualities that could prevail over time, to be able to set priorities and adjustments for a sustainable built environment. For an overall assessment of existing architecture Robertsson's guide (2002) is still used by Swedish architects, but today there is also Stenak's *SAVE-analysis* (2011) and Rienar's *DIVE* method (2009) as well as CABE's *Design Review* (2006) from the UK that can be used. The latter is for assessing planned projects and is also the basis when assessing and judging all entries to the World Architecture Festival, WAF, but works equally well for assessing existing built environment. There is also Nylander's (2002) attributes for assessing the architectural qualities of the home. Many architects have also worked out their own methods, but regardless of the choice of method, some questions must be clarified by the mapping. Is this site, building, material etc. a resource to preserve, restore or recycle?

The overall assessment is about the design of the place, the brief, the building, the layout of rooms/spaces, the entrances and materials and functions in relation to the activities, work, living etc. on the site, in the building and for community's development on the whole, both the historic and future development. In this, people´s experiences play an important role – their experiences of the site, the building and the events that have taken place there, living on in their memories, and forming their expectations. For this task interviews and surveys with questionnaires can be used, and the SMB, a semantic environment description, developed by Küller (1991; Tucker Cross & Küller 2003) is a proven tool. Another way is to perform a Walk Through Evaluation (de Laval 2014), with different users and professionals, on the site or in the area using questionnaires that are discussed and analysed at the ned of the tour. The aim is to map potentials and deficiencies to guide the planning.

Finally one has to look into the limiting issues: what legal requirements must be met in terms of accessibility, fire protection, security, listing of heritage values, energy consumption etc., but above all health and environmental impact for the sustainability aspect.

All empirical data is important in the design process that follows, which should result in a concept for the building´s future. The work contains a 'reflective conversation' (Schön 2011) with questions and answers. What is the idea of the building, its place and role in the context? What can be enhanced,

attenuated or mitigated? What possibilities are legible in the various resources? The answers will be found in the concept and programming documents. Design drawings, quality plan, etc. are delivered and in the construction phase site inspections are carried out and documented. In the final inspection the reconciliation according to agreements will be verified. In initiating a project the very first phase is crucial and Ryd's book (2008) about management in this matter is a good guide.

Art and architecture traditionally used mimesis, or, replicating nature, using proven methods until the 19th century, but then came the emergence of an aesthetic production, in which the artist was projective, looking forward, to create something new and not only learning from earlier knowledge. From this a diversity of directions were taken leading to the different art and architectural styles of the past century. Architecture has always been part of the societal development and political decisions, but also taking advantage of industrial innovation. Architects are by necessity influenced by many needs and they often use a multi-methodology approach comprising both the ideographic and the nomothetic, as architecture is also an applied science of conceptualising construction. Furthermore, architecture, or the use of it, has an effect on peoples' everyday lives. The use is of greatest significance for and intertwined with the owners, the residents, those who work in the building or occupy it. The end-users are all stakeholders in the decisions affecting the built environment. Whatever direction an architect takes and whatever the task given, people are always involved in one way or another. Communication is thus an important part of the work, together with interpretation, but must be paired with a good portion of pragmatism.

13.4 Similarities and dissimilarities

The professions' working methods do not differ much from each other. There are similarities and in many ways they use the same working methods. The complicated field of existing and historic buildings and their use demands an interdisciplinary approach, and in practice a pragmatic approach is preferable. All three professions at some stage work with approximations that can only be managed by experience and practice, either their own or a colleague´s. All of them struggle with analysing and synthesizing empirical data to gain the knowledge needed for their task.

Knowledge today is divided, and fields of expertise are narrowing creating more and more specialised knowledge, but knowledge is never a simple idea. It is always situated in time and space, and always involves people who all have different experiences, which are processed into knowledge. There is a constantly on-going production of knowledge that cannot be separated from culture and society today. With the different knowledge fields follows a certain professional culture and with different vocabularies, but in a 'broader sense, "culture" is the sum of the beliefs, values, knowledge and uses of a social group. This sense, which may be called "anthropological", includes every manifestation of everyday life in a social group' (Muñoz Viñas 2011). The different social groups one meets and those one belongs to can be demanding, but they can also be very understanding and supportive.

13.4.1 Two conceptual views

The following emanates from practical experience of working with the different professions´ methods, partly in earlier practice and partly from work and workshops carried out in Phase 1. The two figures 13.1 and 13.2 below can symbolise the starting point when exploring the professionals' views on the building as a concept.

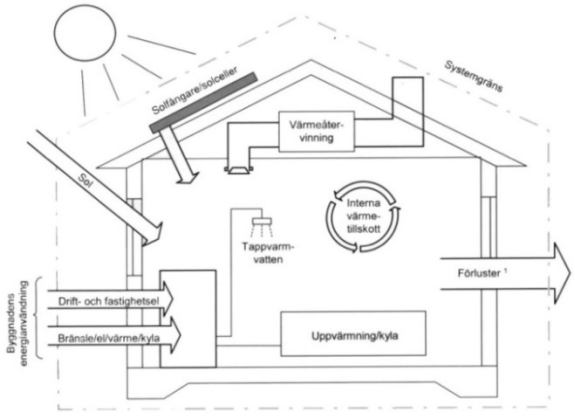


Figure 13.1 Illustration of all interacting systems needed for heating, hot water, ventilation and a good indoor climate. Illustration from Boverkets byggregler BFS 2011:6, p.63.

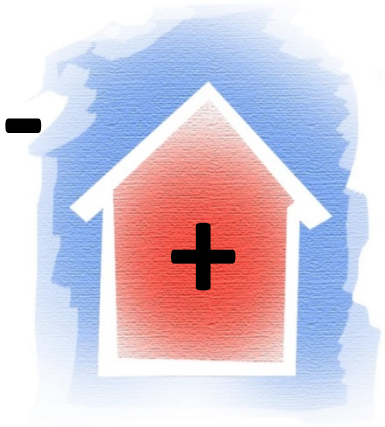


Figure 13.2 Simplified illustration of what is really important.

The first figure 13.1 represents the engineer's view of a building showing all interacting systems in a building, necessary and needed for energy supply and a continuous sufficient and good thermal indoor climate. It is based on causality, of cause and effect, asking the question *how*. The other figure 13.2 could be said to represent the architect's and the conservation consultant's view showing a simplified, symbolic view of what is really important, based on motive, asking the question *what*. 'All buildings are expected to modify strongly varying local exterior climate to significantly more consistent interior climate' for human use and wellbeing (Edén 2007). Both figures actually show the same thing – from two different perspectives. Sometimes more information is needed to get to a result, and sometimes one has to peel off all details to access the core.

13.4.2 Similarities

The field of conservation is vast and consists of many conservation professionals working with, for example, administration, safety, economy, tourism, but also conservators. According to Muñoz Viñas (2011) the definition of the profession is that 'conservators have a strongly specific knowledge, which is not applicable outside of their field'. By this clear definition, architects and engineers who have knowledge outside the field of conservation are not conservators. Yet they can take a specific

course or attend programme in order to add conservation to their expertise or to work exclusively with conservation, becoming a conservation architect or conservation engineer. Muñoz Viñas continues that there are two key features of the conservation profession; closeness to the conservation object and its specificity. Conservators usually work in close proximity to the object and usually work with conservation treatment of cultural property. Conservators may occupy heritage management positions or manage a conservation centre (Muñoz Viñas 2011), but the main task for conservators is using scientific methods in the present and preserving the past for the future, with concomitant maintenance to delay deterioration. This time perspective is showed in figure 13.3.

Figure 13.3 Illustration of a building´s timeline, to which all three professions have a relation.

The different engineer's roles are basically working with a building's structural elements such as foundation, walls and vaults, trusses and beams and with building physics, moisture damage etc. To establish what causes certain kinds of damages it is necessary to theoretically go back in time to detect the deterioration processes. An engineer can specialise in many different areas of the engineering field, including project management, which is quite common, but an main interest in a building´s present state is what it says about what happen in the future. The work is projective, aiming at predicted solutions for a better future state.

The architect´s field of interest and need for different skills is wider and goes beyond the field of conservation, just like the engineer´s. Muñoz Viñas (2011) points out architectural conservation as a 'somehow distinct field from the rest of the conservation fields' owing to its social recognition and long academic tradition: it has always been one of the major arts, it has produced an important body of knowledge, which has passed the test of time. Furthermore an architect does not need to work in detail with, for example, preventive chemicals to protect materials; instead he or she designs the project to be implemented by other experts and specialists, and also sometimes has to act as team director, as the process requires cooperation among many other professions. For the architect the present and the future are as important as preserving the past due to practicalities like legislation and standards, function and management.

Buildings are subject to strict norms and legislation, and architecture must live up to a plethora of technical standards and demands for accessibility, safety etc., that do not always go hand-in-hand with conservation requirements. All professions involved in a construction project must have an understanding that addition of a particular function or other changes are necessary and imply a progressive aspect.

13.4.3 Relation to time and function

All three professions have a relation to time and to transformation. The conservation profession's work is focused on the past, its traces in the present, and the preservation and maintenance of it for the future, while the architect's work is to look at the past in the present to see qualities and the possibilities for transformation for future use, and finally the engineer's work which is to look at the present, detect the past to define problems to solve for transformation for the future.

These are generalising comments but they help to frame the similarities and dissimilarities. What the three have in common is a relation to time and the use of the building and a constructive approach creating specialities of various kinds connected to their professional skills. If the engineer *works with*

problems to create (Chalmers 1999) special solutions, the architect *works with possibilities to create* (Cross 2006) special conceptual design, and the conservation officer *works with history* in all its aspects *to create* (Unnerbäck 2002; Muñoz Viñas 2011) special preservation and maintenance plans. The dissimilarities are their different points of departure and perspectives, and the similarities in what they actually do become quite clear.

All the professions must actually create something of what already exists. Interacting with *other people and their knowledge* becomes a matter of creating something new, which is more than the sum of the different parts.

13.5 A foundation for mutual understanding.

13.5.1 A classic dilemma

In assessing and working with existing buildings, a great variety of working methods are in use, but this suggests that there may be contradictions between the different professions' interests. This is a classic dilemma of the engineer´s nomothetic focus on laws (*nomos* in Greek) in natural science, and the conservation officer´s traditional ideographic focus on the individual (*idios* in Greek) and the unique. This could be exemplified by the engineers, emphasising the interest of, for example energy efficiency, and the conservation officers, emphasising specific historic values. However, the boundary between the nomothetic and the ideographic does not coincide with the boundary between natural sciences and the humanities according to Liedman (1998) who mentions several examples that comprise both the individual and the general in the economic field and within biology, sociology, history etc. Of course an engineer also works with design, how a technical solution appears, and the user interface, how people can manage and use a technical solution. A conservator is, as mentioned earlier, dependent on experiment, empiricism and controlled methods, and nowadays is often highly educated in chemistry. Architecture is both nomothetic, in that it must be adjusted to laws of nature in physics, and idiographic - seeking the unique - and architects also use working methods common in social sciences when planning and designing. This applies to all three professions while all are working with a wide scale of projects from details and rooms to cities, and this broad perspective is a driving force for synthesizing knowledge and also requires an interpreting ability as well as a generalist competence. By looking closer at the working methods the similarities outweigh the differences.

13.5.2 Similarities in practice

Practical measuring of a building's surfaces and understanding all integrating systems within construction is complicated and time consuming. Any miscalculations can produce large variations in the outcome. Although reductive and accurate working methods are used it is necessary to make approximations which can only be made with prior experience of similar work. This is crucial for interpreting the figures on consumption and calculations of transmission losses e.g. to know what could cause low or high figures and demands a solid base in both practice and theory.

Making inventories and pilot studies of a building's materials and systems, its style and place in history and its development, which are legible in the different time-layers, is equally complicated and time consuming. Data found in archives are not always found on the site and vice versa. The interpretation demands deep knowledge as well as experience. Whatever the conclusions, it is never absolutely certain that the calculation or interpretation is correct and they must always be adjusted, comparing facts with reality, until as many influencing factors as possible have been detected. It is necessary to interpret the built environment and experience of similar work or to consult experienced colleagues.

In assessing architecture the same prerequisites are necessary – both theoretical knowledge and practical experience are needed to know if a building is pure style or actually has a gestalt based on an idea. Furthermore 'architecture must be used to be perceived as architecture' as Della Torre stated in Workshop III, and this implies that all functions, different systems and all integrating aspects within a building and its context must be coordinated to work. In architecture a multitude of working methods have been developed for different uses depending on what is to be designed or investigated. This situation is comparable to the engineering and the conservation fields as well.

13.5.3 Systems thinking

Assessment in itself is standardised and linear, but assessment of properties and values found regarding high or low quality, are sometimes non-linear and irregular, and can be either tangible or intangible. The nomothetic and generalising *systems thinking* used by engineers, conservation officers, architects and most professions is based on the traditional mechanistic conception provided by technology and natural science. Collecting data, making linear assumptions and generalising by using pattern matching are common techniques. Systems thinking is predictive, and used for framing the project and reducing it to manageable parts. Understanding a building's history or all functions and systems that must interact in a building is complicated but can be investigated, and problems solved.

13.5.4 Disciplinarity

Rational action presupposes professional knowledge, which is crucial for serious reflection about the consequences of suggested measures, but there is also a need for the ability to imagine the consequences. Working together the three professions cover the whole building with its history and authenticity, mechanical systems and construction, function and design. The building and all its components is complicated, but the work of collaboration among all the fifferent professions is complex. In all professions a vocabulary of technical terms has been developed that facilitates communication between people of the same profession. Architects, engineers and conservation consultants do not always work with the actual construction at an actual site – they make the concepts for the work carried out on the construction site. In the conceptual as such lies a demand for a working professional language that is necessary for communication. Lundequist (1995) asserts that one has to master the discipline's tools of which the most important are the concepts and theories that constitutes this discipline. Every profession needs a language as a prerequisite for a theoretical base. It forms the notions and the context, as building blocks and structure (Uppman 1990). In practice it saves time, makes it possible to be quite detailed, and also confirms the user´s own affiliation, where one belongs, the tradition one has been educated into and formed by through training and practice. Simultaneously, the vocabulary of technical terms excludes other professions and non-professionals as well. Sometimes it creates problems, such as in construction site meetings. Using a vocabulary that others do not understand, without explanations or without sufficient arguments, is a misuse and could also be seen as an act of power to take command. This was the case in a story about the choice of ventilation system told in Workshop IX. This is only one example but it can illustrate why transparency and a horizontal organization is needed. The vocabulary of technical terms is part of what Bourdieu (1990) would call a *habitus*, part of what Fleck describes in his *thought style* (1979), and part of Rosengren's *doxa* (2003). With greater transparency and clear arguments a common *doxa* for how to manage the new combined field, of energy efficiency in existing and historic buildings, could be developed.

13.5.5 Systemic thinking

Complexity increases the more people are involved, for example, when the users or inhabitants and their habits and behaviour are added into the picture. In these matters linear systems thinking also needs to be supplemented by, or combined with, non-linear systemic thinking (Nilsson 2013). All three professions also have use for social science to find out, ask or imagine how people use their homes or offices, what hours and functions, to calculate the energy use or to design user-friendly interfaces, for example. For the conservation officer the use must be mapped through history, the societal and techno-historic impact and so on. Systemic thinking, contrary to systems thinking, is dynamic and puts people, their well being and their behaviour in focus, and is needed for understanding human processes and relations which often are unpredictable. The sciences are in many ways standardised but they are not static. In some ways they are all predictive, but the views are constantly changing due to society's complexity based on human activities, and also due to technological developments. For these reasons it is also necessary to think projectively and to be adaptive. Human communication is complex and also dynamic. Our main source for understanding it is our experience which is the basis for *systemic thinking*. Within this thinking or concept some useful methods have been developed which are described in chapter 16.

WORKSHOPS

14 The workshops

Six workshops were planned within the frame of this work, but nine where actually performed and the outcomes are summarised and presented here. Three workshops were performed in Phase 1 and six in Phase 2, with in total 112 participants, including the promoter, which is showed in table 14.1 below. Themes and focus have been directed on the physical work on the restored buildings, on the working processes and on the proposed model. Professionals from academia and practice attended which was an important part of the research methodology. The outcome and the participants' comments and advice on the research have directed the project adding architectural values such as a unit of analysis and looking into the legislation concerning built heritage. To give an overview of the workshops and their development, the summaries from the three first ones are also presented. The workshops have worked as a transdisciplinary arena for an iterative design process, where the work has been brought forward step by step. Brief descriptions of decisive outcomes from the workshops and their importance for the research on the whole have been presented in chapter 8 where also explanations for the summaries varying length are given.

In brief number II, VII, VIII and IX were short sessions with a small number of participants and two or no lecturers. These factors are reflected in the summaries that are shorter. Workshop I, III and IV lasted a whole day and had five lecturers. These summaries are a little longer. Another influencing factor for all the shorter summaries is that they are based on handwritten notes. Workshop V and VI were recorded and transcripts made. This was a time consuming and difficult work especially to transcribe discussions with many people taking part in the discussions. These summaries are much longer and in particular workshop V where six people lectured on a mix of subjects which engaged twenty participants in the discussions.

	WS I	WS II	WS III	WS IV	WS V	WS VI	WS VII	WS VIII	WS IX
Conservation professions	5	1	10	2	5	4	4	—	—
Engineers	10	11	—	5	3	4	—	5	—
Architects	3	3	6	7	12	4	1	1	6
Total	18	15	16	14	20	12	5	6	6

Table 14.1 showing the number of participants and the distribution among professions.

14.1 Workshop I — Energy efficiency and preservation in our built heritage

The study's main questions were discussed in the very first workshop when the framework for the study was set; the problems of old buildings and the moisture problems that often play a major role in both conservation and energy use. The workshop took place at Heritage Halland in Halmstad.

14.1.1 Energy and building design

Professor Edén, Architect, had his parting point in his book about energy and building design (2007). The system requirements are set early in the design process and to define them one has to know the context well, and to know the difference between a kWh and a kWh in energy. Edén had an

explanation for this. Since the phase of maintenance including heating is heavier, one must use more low-grade thermal energy and less high-grade electrical energy for this purpose in this phase. This is the crucial difference between different kinds of kWh. There are still too few evaluations of energy efficient building projects. A systematic inventory could be divided into the use of closed and open systems.

The architect works with design and with building users which implies work with processes, but also with technical issues as well as the site and other contextual issues. Anyhow, most of the building stock is already constructed and the built cultural heritage has a system of valuation of its own which also has to be considered. In general, the orientation of technology must become more directed at buildings as interacting systems, where the total performance is respected. Someone in the construction process has to bridge design, participation processes by clients and users, and technical issues and so on. Today there is a technical base for energy efficient buildings. As an architect one can start from this and exploit, develop, reinterpret, and reinvent new forms for the built environment and for the systems, together with all parties involved. The problem field is wide and the solutions of many different kinds. The local and global perspectives are equally important, where the local has a bigger effect on the physical context and the global a value as symbol and for overall impact on energy use.

14.1.2 Building physical hazards associated with energy efficiency

Professor Hagentoft, building physicist, lectured on physical risks associated with energy efficiency in buildings. Functional requirements seem to have fallen out of focus today when society demands - and the economy seems intent on - minimising energy consumption. IEA, the International Energy Agency, has calculated an enormous potential for savings. What in general are the biggest risks, and cause most damage in buildings today, are different sources of moisture and our various ways of trying to overcome them. We have to adjust constructions and materials for each and every new context. Moist indoor air always has higher humidity than outdoor air because about one bucket a day vaporises indoors. That is why the vapour barrier is extremely important for preventing diffusion and convection. In older buildings added interior insulation is a common measure, which is a risk as the relative humidity, RH, rises indoors in these cases. The construction will be very sensitive to air leakage from within and will also result in a colder exterior side. It is of utmost importance to have control on joints and thermal bridges, like the attachment of floor joists to the façade, when using interior insulation, since problems can be built in and not be controllable. Risk calculations should be performed before actions of this kind are carried out. There are good programmes for risk analysis.

Simon Pallin, engineer and doctoral candidate, building physics, lectured about risks with moisture flows at renovations. He had looked into risks related to refurbishment and the upgrading of exterior walls in a residential building. His calculations showed that heat and humidity transport or moisture transfer in the attachment of concrete floor slabs and walls and stud walls when adding exterior insulation could be a risk. Every object is unique and demands calculations but there is a rule of thumb about the vapour barrier. Seen from the inside it should not be placed deeper than 1/3 into the wall, which is extremely important.

14.1.3 Discussed measures for Fattighuset

During the first workshop, questions arose as to what measures it was possible to perform in Fattighuset. The object was visited and practice and problems were discussed with this first surveyed object as a starting point. Calculations and assessments and gathered facts were presented and discussed. A list of possible measures was compiled, and almost all of the suggested measures were aimed at creating a better indoor climate and comfort for the tenants.

Table 14.2 below shows a summary of the pros + and cons – and their consequences are discussed. During the discussion it appeared that some measures counteract and some interact. Every measure was looked upon from four different aspects. The property of being possible to let is strongly connected to what the tenants want and are prepared to pay for. Some prefer low costs and care less for comfort, some care more for good indoor climate and others care for appearance and ambience etc. This special property is hence dependent on all aspects and has not received a special column.

MEASURES	FOUR ASPECTS			
Fattighuset	**Preservation**	**Energy/environment**	**Comfort**	**Manag./economy**
Interior 3:rd window pane (the exterior may not be altered)	(-) Original appearance/view changed (+) addition of one extra pane will preserve the original windows untouched	(+) less heat loss (+) less energy use and hence less emissions	(+) better air tightness/less draught (+) no cool convection, bigger floor area along the walls can be used	(-) new investment (+) lower running costs
Original walls restored and preservation of some floors	(+) a very high quality	(-) bigger heat loss (-) more energy use and hence more emissions	(-) lower surface temperature on interior walls gives feeling of draught	(-) new investment (restorer) (-) higher running costs
Interior insulation very thin layers of nanogel / aerogel. (the exterior may not be altered)	(-) painted original walls hide behind a tight layer (as present) (+) painted original walls are preserved behind a tight layer	(+) less heat loss (+) less energy use and hence less emissions	(+) higher surface temperature on interior walls gives less feeling of draught (-) risk for moisture problem in the construction	(-) new investment (+) lowered running costs
Air Star fresh air vents with electric heating/recovery	(+) no major exterior change (-) very bad appearance in interior with a ”box” at every fresh air vent but (+) leaves the solid construction untouched	(-) more electricity use gives more emissions* (-) more electricity use is wrong system-thinking when renewable district heating is installed * (-) counteracts existing depressurized ventilation	(+) higher temperature on supply air (+) higher temperature on interior walls give less feeling of draught	(-) new investment (-) / (+) higher/lower running costs
Exhaust/supply/heat recovery-ventilation system installed (complementary) and plugging of fresh air vents	(+) no major exterior change (-) new holes in the construction for ducts (-) visible ducts alters the interior	(-) more electricity use, see above* (+) higher energy efficiency in existing system (+) use of waste heat	(+) higher temperature on supply air (+) higher temperature on interior walls give less feeling of draught	(-) new investment (-) / (+) higher/lower running costs
Higher flow temperature in the supplied heating system	(+) no material/visible changes	(-) higher energy use gives more emissions (+) district heating gives low emissions	(+) More heat causes less cold convection at windows and increases the comfort	(+)no investment (-) higher running costs
Better lighting, new demand in official sites	(-) more and stronger lighting spots alters the interior	(-) more electricity use gives more emissions	(+) better visuality (+) greater security, safety	(-) new investment (-) / (+) higher/lower running costs

Table 14.2 Suggested measures for Fattighuset seen from four aspects, showing pros (+) and cons (-).

The energy use and comfort can be understood as synonymous, or like two sides of a coin, in a building where the envelope hasn't been altered. Low energy use – low comfort and high energy use –high comfort. As a very short summary the preservation issues have been prioritized foremost on behalf of the comfort, but partly also on behalf of the energy issues.

14.1.4 Discussion and comments

Some comments were made. The most open way to look at the building is in its context with all interacting systems where human activities are included. The emphasis for technical orientation must find its' way towards the building as a system where total performance is considered. And there must be another way to assess historic values, with their complexity, taking architecture into account in a proper value system. This could lead to the model = faster formulation of problem and balancing against regulations and, energy and preservation demands.

The owner of Fattighuset was planning for a refurbishment. This had been needed since it was restored in the 1990s. The Architect, Schriever-Abeln, had been engaged by the owner, for new alterations to facilitate new activities and businesses in the building. He suggested a new entrance and, to solve the accessibility problem for disabled people, ramps were needed. He also proposed a elevating of the back yard area. This implied significant changes to the façades and the question was raised as to whether it was compatible with the existing values and the buildings' classification in the municipal preservation plan. It seemed to be a conflict of interest. The question was raised about what requirements there actually are in the legislation.

During the day the concepts of passive houses or zero energy and even plus energy houses came up and the discussion thus came to revolve partially around the production, distribution and sale of energy and energy services. The new services open up a diversified business for our energy companies. It was also established that the energy market is affected by possible energy supply, our economic system, taxes and subsidies and thereby also by politics. It seems that from whatever angle the energy issue is looked at, it has a high degree of complexity.

14.2 Workshop II — Energy efficiency in theory and practice

The second workshop considered the energy issue; efficiency and also how an energy expert is trained and how he or she carries out an energy declaration. Fifteen people attended and it was held at Teatern in Laholm, one of the objects in this study. Tobin, an engineer and educator of energy experts, started with the definition of the different system boundaries, energy and exergy, and the ratio of the output to the input of any system, and established that the declaration had been adjusted to the mandatory provisions, *BBR*. Tobin also pointed out that the energy requirements do not take the energy source and if it is renewable or into account and not whether the energy source is renewable or not. There is a law, a regulation and mandatory provision (Boverket 2010b) on what, when and how an energy declaration shall be carried out.

14.2.1 Energy declaration in theory

According to the law a declaration is needed when a new building is erected, for all existing special buildings with a floor area over 1000 m^2 and for all existing buildings with tenancies, and when a building is sold. The certificate may not be older than ten years. All exemptions from the obligation to have an energy declaration made are listed in the regulation. These are regional and national notable/listed historic buildings, industry, farm buildings and those in forestry, holiday cottages, buildings with floor areas of less than 50 m^2, temporary buildings, secret military buildings, and those for religious use.

There are mandatory provisions on what is required and how an energy expert should be certified, in *BFS 2007:4 - BED 1*. There are extensive requirements and a large knowledge test must be performed before certification. Nevertheless the assessment of possible cultural and historic values in a building is best performed by another expert, preferably certified according to *BFS 2006:6 KUL1*. The first mandatory provisions for certification of experts on cultural and historic values came into

force in 2005, and have recently been updated. In one of Tobin's companies they have education and courses for this too, which is an advantage and makes for good cooperation.

All data needed for the declaration should be provided by the owner. The results after processing should be reported to a national database. The aim of the declaration is not only to promote energy efficiency but also to promote a good indoor environment. All proposals for improvement of energy efficiency should be put forward if they are economically justified. The proposals should be given with estimated costs in SEK/kWh and pay off time in years but it is actually not compulsory to implement them. We do have another law - the Environmental Code, *Miljöbalken*, (1998) - which can be interpreted as saying that energy efficiency measures should be carried out if it is possible to do so. The different laws are not yet harmonised. New laws are always evaluated and it has been shown that an energy declaration can lead to very different outcomes, depending largely on whether the building has been visited or not. It will likely soon be mandatory for the energy expert to visit the building in question.

Tobin also mentioned the advantage of using IR camera and other various aids, and different ways of performing the energy declaration, and the difference between a declaration and an energy analysis. At windows with very low, i.e. good, U-values where no cold convection should appear, it can appear anyway if the height of the windows is more than 1.5 meters. He had many more examples and in the end when comparing calculated and measured energy demand the potential of savings becomes clear. Tobin also talked about strategy and strategic choices and thinking in systems, which always must be included.

14.2.2 Energy declaration in practice

Sundquist, engineer and certified energy expert, gave examples from his work of what difficulties there are and how to solve them. He and his colleagues always do visits on site and a larger, single building takes about 15-30 hours to certify. They use BV^2, a calculation programme, which is well established and was developed at Chalmers. According to studies made at the University of Lund, though, due to thermal bridges differences in calculated energy use can amount to as much as 20 % regardless of what programme is in use. Another example concerned a business company that lowered its energy use by over 60 %, from 60 MWh/month to 20 MWh/month, simply by engaging an expert who corrected errors in the operation, adjusting and optimising the control and regulating equipment. No change of heating and no added insulation or alteration of windows or other appearances was made – this was one of many good lessons learnt in this workshop.

14.3 Workshop III — The Heritage sector

14.3.1 Risks and opportunities

The third workshop had risks and opportunities in the heritage sector and new strategies as a theme. The workshop was held in the Department of Architecture at Chalmers and sixteen people attended. It started by looking at the difficulties involved in assessing cultural, historic and architectonic values, which appeared during the work in the EEPOCH project. A referral on amended mandatory provisions showed that the same low figures on energy use for new buildings will be required for alterations to existing buildings. It is probable that none of the objects in the multiple case study will manage to meet these requirements when planned alterations are carried out. This is worrying since a building's possible preservation is linked to its usefulness and adaptability to new activities and use. In most cases this implies refurbishment. With this background, the need for clearer methods of evaluation becomes evident, as cultural values should be balanced against energy requirements. The handbooks in use today have gaps in alignment with the current viewpoint, which is increasingly

based the on user´s perspective. Manuals and methodologies needs to be extended and upgraded. One way of partly doing this could be to add a method for assessment of architectonic qualities.

14.3.2 New method for assessment of built cultural heritage

Fredengren and Génetay, conservation officers from the National Heritage Board, NHB, have been working on a new method for assessing cultural and historic values as a mission to review the criteria for national historical monuments, managed by the National Property Board, NPB. They had a series of meetings with the NHB's employees to define intrinsic values, user values, scientific values and cultural values. Also at issue was how NHB presents these identity values. One criterion for state ownership must be to give all citizens access to heritage at a public site.

The relationship of heritage to sustainable development – environmental, economic and social – was also discussed. The need for a new model originated with changes in the surrounding world. This was combined with public welfare and national responsibility, when choosing the narrative model. The narrative model had already been presented by Arvastsson during the 1990s and NHB developed it. They tested the new model together with Unnerbäck's model in one object Ågestaverket, Sweden´s first commercial nuclear power plant, and in both cases it was found that the object was part of our heritage and worth preserving. The national value of cultural heritage was assessed against a background of national cultural and historical narratives describing different historical phases, which the objects should belong to. The starting points in geography, gender and class, generation and ethnicity, to tell everyone's story, were necessary for credibility. An independent research group developed the stories to describe Sweden's historical and cultural development. NPB used the model on the stock they were set to manage. 90 % of it was found to be a part of our history, fulfilling the criteria and worthy of inclusion, for cultural and historical reasons, in the national holdings. This raised the question on how the results could be perceived, interpreted and used on a local level. The continued work for NHB includes the issue in a new handbook or framework, defining what can be considered a national interest and what are the priorities, and a revision of the Cultural Heritage Act.

14.3.3 The Halland Model

Gustafsson, Director of Heritage Halland, conservation officer, has explored the heritage sector both in theory and practice through the Halland Model concept. He started with the story of the sports auditorium, which was part of Halmstad's local identity. It showed all possible high rated values according to the assessment models in use today. Yet it was demolished. Why? 'We did not get anywhere with legislation, *PBL*, plans or Unnerbäck's valuation model.'

The most significant change in the last decades is that the national strategies lost their meaning when the European perspective emerged. The national focus is a top-down system while the regional focus is a base-up system, and decentralisation created a regional arena easier to impact than the national one. Sustainable development got its regional strategy with environmental, social and economic dimensions. We left the national guiding principles to build on the specific in every region instead. The history and characteristics manifest in the built environment are a strength and an advantage, and part of the region's strategy for growth. Heritage should not just be protected but should be used, and should even be a driving force in sustainable development. The new horizontal triple helix system is cross-sectoral and system wide. Gustafsson presented the trading zone and the Halland Model, which his thesis is based on. It is defined as an active arena for negotiations and exchanges of services or a field of force corresponding to the actors' policies, values and resources.

Traditional protective work within the heritage sector was transformed into proactive work making big inventories to bring to the negotiation table. The inventory is linked to the municipalities and

their department for building permits. Restoration of built heritage becomes, through the Halland Model with all participating parties and the turnover it generates, a part of the growth in the region.

Gustafsson also mentioned Sacco's strategic matrix for resource use, development and growth in the cultural sector. When using the matrix for an inventory it shows that the actual production within the cultural sector is scattered across a region. Even though the big institutions like theatres, operas, museums etc. are in the main regional centre, the growth is out in the region. He also mentioned Throsby, who contends that all motivation for economic activities is the concept of value. It is important to identify and take advantage of existing, actual values.

14.3.4 A research agenda for heritage sector: an Italian viewpoint

Professor Della Torre, Architect, referred to a new convention from the year 2000 when restoration got a new focus in Italy. The context was now emphasised and not the single masterpiece. The concept of territorial systems, including social and economic systems, was developed. Restoration should be preventive with authenticity and reversibility for sustainable management of our existing resources. With addition from today heritage could acquire new uses and new possibilities for interpretation could emerge. The concept of conservation was enhanced to include use, e.g. as an asset for tourism in learning regions. The Italian regulation protects *beni culturali* i.e. work of art but now a building cannot be separated from its landscape. Della Torre called this recognition. When the surrounding world develops but not the heritage, the heritage becomes a museum.

Everything has a cultural and historic value depending on the chosen perspective. The concept of conservation is connected to ideas developed by Bardeschi and Bellini. All evaluations and assessments are relative and time-bound. One cannot isolate a building because it will then lose its different time-layers and authenticity, as John Ruskin (1989) and Alois Riegl (1982) observed. Buildings should also be able to be used. Architecture must be used to be perceived as architecture.

Most people agree with Feilden's words from 1982, that the mission of conservation is action to prevent decay, but many interpret this to mean that cultural heritage is and must be static and not reflect the dynamics of the surrounding world. Urbani and Paribeni developed a theory of equilibrium and balance during the 1980s, to maintain pure restoration. Heritage was not allowed to become dilapidated or to be modified to meet new needs. This was a defensive strategy.

With human ecology as described by Ceruti, the concepts of co-evolution and of widening the limits instead of limiting development are emerging. Ecology and restoration becomes a science and an ethic of diversity. Diversity and identity in a developing co-existence implies change.

The task for the expert is to find new meanings and make relative interpretations of the heritage, and show the dynamic nature of a building's significance, consisting of a variety of values reflecting a variety of interests. These must be utilised to engage people.

Conservation today is characterised by the concept of sustainability and is also expected to be sustainable. This entails increasing complexity. If a building is to survive, adjustments are necessary to meet new needs and also to have a dialogue in the context of co-existence and mutual impact between heritage and society. This demands a long-term strategy of integrated conservation or planned conservation as Della Torre called it. It requires new tools for understanding conservation as phases of processes, and is an important shift to preventive work.

Within wide-area projects the notion of conservation is enhanced by the economic aspect. The sites are included in sustainability plans, not only as suitable for tourism since negative effects have been identified in this branch, but from a sustainability perspective. They have another strategy and a

model for understanding the impact of immaterial values. In learning regions the whole context is involved and included in a commercialization plan, aiming at regional cooperation for innovative growth where cultural heritage can serve as a catalyst. The shift from pure restoration into integrated conservation work offers economic advantages. The objective is to get the most out of given resources for a local process of development.

The Italian research agenda has slowly moved from one paradigm to another, from restoration to preventive and integrated conservation, and is now about creating development through conservation. Focus is on the sustainable where conservation is an important factor for regional development. Thus the heritage sector can play an active role in development and have a seat at the negotiation table.

14.3.5 Theory of conservation

Professor Emeritus Rosvall, conservator, mentioned the knowledge building system as a base for research and for academia. Academia must represent questioning and knowledge building, and use the sustainability perspective in this.

Cultural heritage can be divided into:

Products — monuments which are tangible and intangible, with artefacts as objects and images as metaphors.

Resources — which are cultural and economic.

Processes — as a dynamic flow of continuously changing assets.

Of these, the last will be the most important for the future. Conservation has transformed in three stages. The early movement considered the conservation of a few selected historic monuments. The next step was to enhance the boundaries and care also for context, and to integrate conservation in community and national planning. Today's view includes the use and the usefulness for contemporary people and their relation or approach to heritage.

Conservation works with respect for the original, with a minimum of intervention and with use of original material. All actions must be reversible and 're-treatable', i.e. they must ensure that it is possible to re-treat the object to its former, original state and original appearance. For this, thorough documentation is needed before, during and after actions. This is also a prerequisite for preventive work with continuous maintenance as opposed to long-term decay followed by restoration. A diagram was shown of the critical phase of conservation, which has been recreated below.

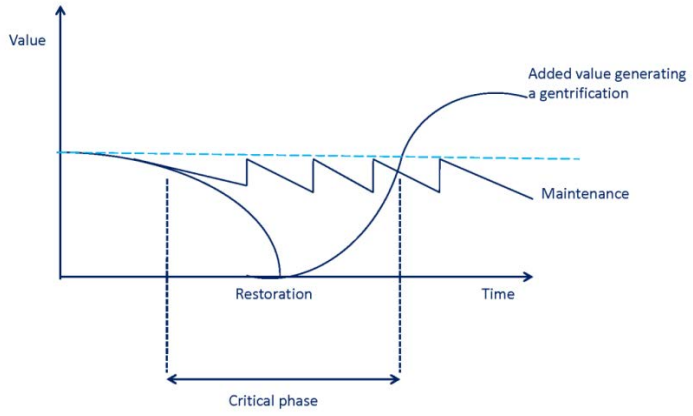


Figure 14.1 is an attempt to reproduce a diagram showing the critical phase in conservation, and the two different approaches to action. The lighter blue dashed line is the object's original nominal value.

Buildings have a long life and it should be estimated in centuries not decades. In the case of continuous maintenance it is important to know which qualities an object possesses originally so that small changes over this long a time will not be added and distort them.

It was also mentioned that there are three phases of conservation. The first one involves the skilled crafts, is traditional, ethnocentric, idiographic and is based on the unique and individual. The second phase involves scientific conservation, is modern, transnational, nomothetic, and based on the universal and general. The third phase belongs to the future and is a multifaceted, analytic, problem oriented holistic view including interdisciplinarity as well as transdisciplinarity. The third phase can be developed cross disciplinarily to a new discipline.

Conservation has different structures to work with, as in structures of building construction, structures of society, cultural structures and invisible structures. The process of conservation is based on the assumption that all kinds of material products concerned are bearers of both explicit and hidden messages. The latter includes intangible values or non-measurable values. A table was shown, that was very simple at a first glance, but it turned out to reveal a lot about the issue.

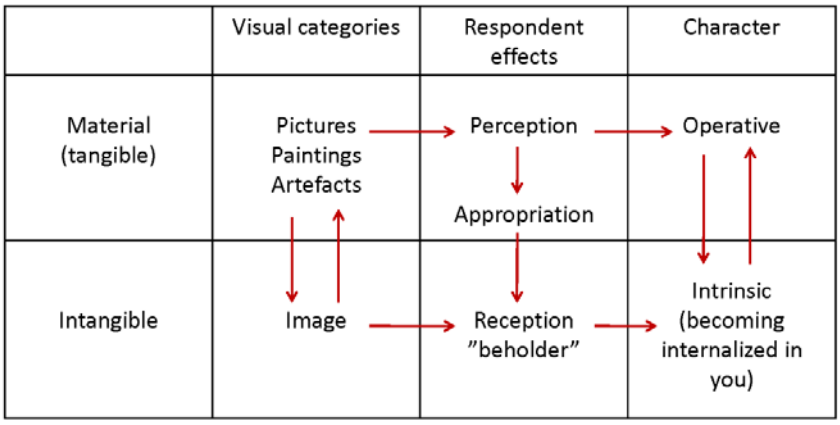


Figure 14.2 The intangible values are not easily communicated while having an invisible structure and can only occur in the eyes of the beholder. One cannot write a guide for people's insight.

14.4 Workshop IV — Risks and added insulation

This workshop was held in the Department of Architecture at Chalmers and started with a short summary of the results from EEPOCH in Phase 1, and about the three buildings investigated. Teatern in Laholm is the balanced object but yet; it cannot meet the energy requirements. Neither can Tyreshill in Hylte which has been insulated on the interior side, but to keep the solid timber frame sufficiently warm to avoid problems with humidity in the construction, the indoor temperature has to be quite high, and hence the planned energy saving fails. There was a short discussion about possibilities and difficulties in balancing historic and architectonic values with energy efficiency measures such as added insulation. The issue is topical due to new legislation, the law PBL and the mandatory provisions BBR, which were presented. The legislation equates existing buildings with new ones in the demands for energy efficiency. The restored objects investigated in the research shows that none of them could meet the demand even if restored today.

14.4.1 Hazards of energy efficiency measures in historic buildings

Common risks in historic buildings were the next topic. Some parts of the thesis *Enhanced energy efficiency and preservation of historic buildings – methods and tools for modelling*, was presented by Torun Widström, architect and doctoral candidate. The topic was an important subject in the outcome

from Workshop I in Phase 1. The author had worked with methods and models for building-simulation as a tool for calculating measurements, and risks assessments, and analysing the consequences of different strategies. The damage risks mentioned were mould, algae and pests, frost damage, crystallisation and cracking, and also corrosion and other chemical reactions. The causes are in most cases moisture related and in combination with energy measures like altered heating, added insulation or altered ventilation. Less thought-out handling, use and choice of materials could also be contributing causes. The strategies are divided into active and passive where e.g. the area active heating or cooling includes different operating systems, and the passive could be solar heating or night cooling. The active strategy for ventilation comprises various mechanical forced ventilation systems, and the passive is about reducing air leakage and reducing the need for ventilation. Other examples of strategies were dehumidification and humidification, measures to prevent moisture penetration, protective heating, use of buffering materials to reduce fluctuations, uniform tempering, installation of heat recovery in mechanical ventilations systems, and better strategies for control. Added insulation and replacing of windows always reduce the energy need and increases the comfort, but it also implies changes of proportions in the detailing and expression of the building, and often conflict with conservation interests. There is always a risk for moisture problems if the work is not performed correctly. It is possible to find or design elegant and gentle solutions and to balance historic values and energy efficient measures. Moisture calculations can always be performed using WUFI. In general exterior insulation is preferable since the thermal bridges then are eliminated, but this measure is hard to choose if the building's façade is protected from damage and demolition by legislation for its cultural and historic values. At major and complex restorations, a careful investigation is particularly important to prevent the measures from counteracting their purpose. Adverse effects might not be noticed until 10 or 20 years after measures have been taken.

14.4.2 Methods for risk assessment of measures in historic buildings

Next there was a presentation by Johan Stein, engineer, of a new project in Lund also working with risk assessment and measures in historic buildings. Their focus will be on methods for developing concepts for sustainable energy solutions. It will be about the buildings status, methods for risk assessments and development of principles for follow-up of measures. They have chosen to develop methods working with real objects in practice. Their first premise is that there is never only one solution; instead their aim is to view all aspects before any decisions can be made. The overall objective is to build up a national expertise within the field of cultural and historic buildings. They will create good conditions for competent construction clients and retraining of experts, which sounded like a great idea.

14.4.3 Vacuum panels for additional insulation

At Chalmers a project to test vacuum insulation panels, VIP, has been launched, managed by Pär Johansson, engineer and doctoral candidate. These panels have five times lower heat conductivity (λ-value) 4 mW/(m·K) than mineral wool app. 33-42 mW/(m·K), but due to aging effects one should assume 7-8 mW/(m·K) for VIP panels. If the panels are punctured it increases to about 20 mW/(m·K). The panel's core is fumed silica, a fine porous powder and through the vacuum the heat transmission through convection is reduced. The outer surface is a metallised polymer. The panels cannot be cut at the construction site so it requires careful planning when applied to a structure.

The VIP panels are tested in Göteborg in a building erected in the 1930s with a wooden structure. The material is added on the exterior side and equipment for continuous measuring of temperature and humidity has been installed, and so far the results are positive. The main advantage with VIP from a preservation perspective is that it is thin, hence not altering the façade as much as traditional

insulation materials would. In total 8 cm has been added, and the old wooden siding has been reinstalled. The addition of exterior insulation is usually combined with replacement of windows, but in this case the existing windows have been moved further out in the façade to retain the character. Compared with a reference façade the insulated façade is significantly better from both temperature and humidity aspects. Similar projects are performed in Switzerland but with stuccoed façades. In Copenhagen VIP panels have been tested for interior insulation in a residential building with the aim to make a near-zero house. In Germany they have investigated 19 buildings with VIP-panels and the results are good. There are several reports on the subject on the Chalmers website.

14.4.4 Aerogel

After that Axel Berge, engineer and doctoral candidate, presented a second material ─ Aerogel, a relatively new and innovative material whith the lowest density of all porous and solid materials. It has extremely low heat conductivity and good insulation properties. It is also based on silica and can be made vapour-permeable, it can be made hydrophobic and it can be made inert which means that it does not react with other material and it can be made transparent. Test with transparent walls have been carried out and information on that is to be found at www.stoakes.co.uk. The material has been used as insulation in space suits where it has the advantage of not being compressed by mechanical impact, and can retain its shape, thickness and insulating effect. It is fragile in many aspects, however, and tests have been performed to make it a composite material by mixing it with polymers and glass fibre to an aerogel-felt. The felt has a heat conductivity of 15 mW/(m·K). There are also tests on using aero-gel granules mixed with plaster (mineral binding) for indoor use, but it is still under development and more information is available at www.empa.ch. We saw examples on use in buildings but the material is still mainly on the experimental level, and the price is very high. Apart from this it will eventually be very useful as an insulation material.

A possible project was also discussed. Örjan Johansson, engineer and manager, made a presentation of FaBo, Falkenbergs Bostads AB, a municipally owned real estate company. Proposals and measures for the building *Måsen*, erected in 1945 and owned by this partner in the project, was discussed from technical, architectural, historic, and maintenance aspects. The possibility of testing these new materials in practice in *Måsen* was discussed, seen as a possible project and concluded the day.

14.5 Workshop V — Buildings' properties and values, and balancing them

Workshop V took place at Heritage Halland in Halmstad and twenty people attended. The theme for the day was buildings' different properties, qualities and values and methods for assessments.

14.5.1 The Halland inventory

Björn Ahnlund, Conservation Officer at Heritage Halland, told us about the Halland inventory of culturally and historically valuable built environment and what criteria and values were decisive for the selection. The existing inventories were 20 to 30 years old and only 8 to 10 % of the built environment had been inventoried. A new effective way to carry out the inventories by car and with a laptop was decided on. A new form was designed for all necessary data including assessment with a classification in a three-graded scale; A, B and C. The classification was made in field-work in connection with the inventory. They have spent about half a year's work in each municipality. There are about 105 000 properties and today 10 400 are registered as culturally and historically valuable which is about 10 % of the total building stock. All the results from the county are now available at the County Board's website, and they are developing it further.

They used the methodology developed by Unnerbäck from the 1970s to the 1990s for the assessment. The inventory with classification was possible to perform thanks to the conservation officer's pre-

knowledge and vast practical experience. This enabled them to go a step beyond Unnerbäck's valuation model, and were able to choose a level of ambition for preservation through the classification. The inventory is used for building permits, so proposed construction projects can be referred to the conservation officer who now more easily can suggest the protection for the building.

***Classification*:** Class A buildings have a very high value and can be considered as monuments protected by law. In Halland there are currently about 50 protected monuments. The B class buildings are valuable in a regional perspective and should be protected in municipality plans. Finally the biggest group, class C, provides the most work since it comprises the more common buildings, but very important for an environment's character and typical for a period. Several hundred objects were assessed as class A which implies that there are a huge number of objects which could directly be declared as monuments. The A class comprises a variety of buildings, and the buildings' age are of little importance for the assessment. Those with no classification are still protected by *PBL*, the Plan and Building Act, which pertain to all buildings. The classification is a way to clarify certain values, which could have been possible to make through the *PBL*, but it is not capable of doing this. The inventory consists of 5 % class A, 32 % class B and 63 % are assessed as class C and hence a very important group of buildings.

14.5.2 The *Rebo* project

Paula Femenías is an architect, assistant professor, PhD and researcher at Chalmers. She told us about the architectural and other values in the Swedish built environments from the mid 20th century from a research perspective and the *ReBo*-project performed together with housing companies. They have defined the time span to the period of Swedish welfare state from 1941 to 1960 and the building stock from this period is also named the 'people's home'. Most research resources today are used for studies on the 'million homes programme' carried out between 1965 and 1975 in Sweden, but ReBo chose to focus on the earlier period where few dwellings and areas have been refurbished.

The scope:Their research is that there is a lack of knowledge about how to manage this part of the building stock. They have mapped challenges and possibilities. Their aim was to prove that cultural historic values, architectural and social qualities are possible to reconcile with energy efficiency and economic feasibility. That is their hypothesis. Routines and knowledge today are based on new production that has become the norm, and hence there is no capability to manage the challenges arising during the refurbishing process in this older part of the building stock.

Knowledge and education: A discussion directly followed about legislation, the entrepreneurial side, the industrialised building sector, lack of skilled craftsmen, routines for new production that are used for refurbishment although not adapted for it, unique measures, incomplete inventories, and much more. The conclusion was that 'There must be incentives to do otherwise' and we need a totally new kind of accounting to perform restoration in the older building stock because there are no tools for it.

Femenías could confirm much of what was discussed. She has cooperated with *SFV, Statens Fastighetsverk*, in a project investigating educational programmes. *SFV* discerns a need to train more people in the conservation and building area. There are very few that provide restoration as a subject today. Courses in older building techniques in engineering at Chalmers have also been removed. Femenías could show that there are 335 000 dwellings in Sweden that have not been refurbished which indicates that there is a great need for knowledge and education.

The matrix: The project worked with case studies and the researcher's issue was values and how the 'soft' values could be weighed against the 'hard' ones e.g. energy efficiency. As a starting point the material and immaterial parameters were defined and how they could be included in models with a

longer time perspective, and finally they wanted to investigate whether their models could offer a working method for property owners, and if it could be applied for all kinds of building stocks. The method was transdisciplinary and the participants have jointly developed both questions and results. It was an applied project with many disciplines involved in non-hierarchical organisational variations.

They wanted to use a holistic perspective but there were no models for this so they created one and presented it to all partners. From this the real estate companies made a variant, a strategic matrix, adapted to their need, which is one of the outputs from the project. The matrix shows the qualitative values within the areas, the knowledge needed but also potential areas of conflict, and it is connected to different building components. The researchers also carried out workshops where the problems were discussed and highlighted.

The ReBo-model: Femenías showed the multi-value description which they call the *ReBo*-model, consisting of a general building description comprising architectural quality, social, cultural or historic, technical, environmental, economic and also process qualities. They found that there are no commonly or widely accepted models describing the architectural qualities. There are some models in use in Sweden and other countries but none corresponding to the Unnerbäck model (2002). The *ReBo*-model is divided in different levels of which the area of value is one. It is connected to different parameters showing how to measure and define and where the needed knowledge is found. The value area; architecture, is connected to spatial organisation e.g. divided into day light, usability, and the measurable parameters such as balconies, size of rooms, transparency, orientation, possibilities for cleaning and furnishing. There are experiential values, exterior environment etc.

Femenías continued to talk about the *ReBo*-model as being just a part of a bigger package of investigations, and that there should be different maps of inventories where these values should be included. They are tools, not solutions to problems. Other parts were the conservation inventory, investigations of moisture damage, measuring of radon, resident survey, energy statistics and a statement on the benefit of differentiated solutions. Someone commented that packages of measures are important because then the holistic parts like experience values are included.

In a research project there are always more alternatives than in consultant work. One has to understand that there are different views, which was one of the benefits in the project. It was an eye-opener for many who have become aware of the complexity. Technical solutions are no problem but the companies now understand that the problem is much bigger than that, which is important.

14.5.3 Potential and policy for energy efficiency in buildings built before 1945

Next lecturer was Fredrik Ståhl, Engineer, PhD and building physicists from SP, Technical Research Institute of Sweden. His project is *Potential and policy for energy efficiency in buildings built before 1945,* performed together with universities to involve different areas of expertise. Gotland works with conservation, Linköping with system analysis, and simulation of energy use, and so forth. SP provides building physics, moisture control, different technical solutions, and possible risks with solutions. The overarching research question is: How is the potential for energy efficiency in the building stock built before 1945 impacted if cautions for cultural and historic values are taken into account? Their entry into the question is to look at the consequences for preservation of values and the technical aspects if the legal requirements and the climate objectives are followed. Design of policies, technical solutions, and information for dissemination to property owners will be the output from the project.

Different experts use different approaches, and energy issues can be managed through calculations. It is more difficult to apply figures to historic values. They started by dividing the building stock into different categories, and continued with defining a number of scenarios to have as many feasible ways to go as possible. Proposals for measures are put forward, analysed and evaluated from all aspects to find the most appropriate solution for the problem. By the categorisation the efficiency potential and the historic values are detected. All buildings are individual and difficulties are inherent in the categorisation. They examine climate, climate zone and the use of the buildings, type of construction, and cultural and historical values. As a base they use BETSI as a base. It is a comprehensive Swedish study comprising 1700 buildings, and their energy use, building construction and uses.

Scenarios: The scenarios are based on the climate objective and the EU directives on energy where the energy use is to be reduced by 20 % by 2020. This will be achieved by using the existing equipment better.

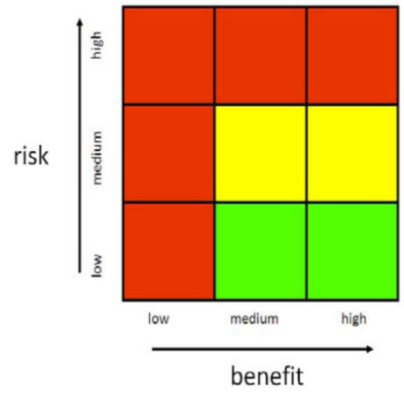


Figure 14.3 Matrix for valuation presented by Ståhl.

Simultaneously the energy consumption in the service sector increases so a more interesting objective is a reduction of energy use by 50 % by 2050. The Swedish energy requirements in *BBR*, the mandatory provisions, are tougher. We have to follow the legislation and take into account the historic and cultural values of the building, but deviations must be allowed. The toughest scenario will be to carry out non-visible measures – how far can one reach considering the energy efficiency under those circumstances?

The measures proposed are considered from different aspects; economy, carbon footprint, cultural values etc. They are also suggesting reversible solutions, and look at the robustness of the building i.e. its ability to cope with change. The indoor climate is important. A building must be of use for people. They have made a matrix consisting of a limited number of factors to see how far one can get, and the consequences are shown when operating it. Green means that it is risk-free from that aspect, red means stop, and if yellow it needs to be further investigated. It is a very simple tool, but we have to weigh the aspects against each other, and therein lies the difficulties.

Ståhl also told us about SECHURBA, Sustainable Energy Communities in Historic Urban Areas, which is a European project where weighting by figures has been applied in cultural historic city environments. They concluded that cultural historic values should have the greatest weight with the figure 0.46, energy efficiency was given 0.24 and environmental sustainability 0.15 same as economic feasibility which was calculated to 0.15.

14.5.4 The heritage sector's on-going work and discussion about a Swedish conservation charter, and about approaches and values within the heritage sector

Hélène Svahn-Garreau is a conservation consultant educated in the United States and employed by Thyréns. Her lecture had a long title and consisted of many important things that the participants wanted to discuss. There is a contemporary discussion about the heritage sector and the meaning of heritage for society, and an ongoing value discussion within the Humanities including sustainable development. There is a shift in perception and views on these matters which have been going on for a long time and it mirrors a crisis as well as abundance.

The background: Svahn-Garreau started by defining traditional notions used in the heritage sector. Cultural heritage is that which society has selected and sanctioned to be preserved. It concerns the material as well as the immaterial and is thus considered to have a cultural value. The cultural heritage is defined by conservation charters or charters for cultural heritage describing a process for the selection that will be transferred to the next generation.

The issue about crisis and abundance is connected to modern society's use of heritage as a means to define itself and as the very condition for modernity which is the reason for its increased importance. The more modern we become the more cultural heritage we get. It is a product of modernity as well as a producer of modernity. There is an acceleration that leads to even more 'past time' and more cultural heritage.

This situation creates a sense of risk, insecurity, loss and crisis when the modern, so to speak turns back on itself and creates risks. Previously risks consisted of lack of resources for survival, while today risks are made of such created by our modern societal conditions. Svahn-Garreau chose to mention a French philosopher, Mark Augé, who discusses this in his books about super-modernity. It is a contemporary discourse about the past, overwhelming the present, and traces are constantly overused and reused. One can no longer distinguish what is true and what is false, and this produces non-places. These are not integrated in the older cultural environment. Instead they become secluded places of memory. This is a theoretical point of departure, and it has an impact on how cultural values are discussed and the contents in the conservation charters.

In a historic light and with the fact that conservation is part of modernity, modern conservation starts in the late 18th century, at the time of the French Revolution. At the end of the 18th century objectivity and a certain relativity arose in historiography and different culture's separate history and development was acknowledged; history was seen as a process. This relative aspect of things and events changing character created a need for authenticity. It was a total breach with history, and all values, universal as well as relative where warped to give an altered view of history and cultural work. The new view, seeking an ideal truth, to unveil an authentic work of art, emanates from the incorporation of an ideal objectivity from natural science. This includes taking over the enlightenment's dualistic concept dividing material culture and immaterial culture, culture and nature, art and kitsch, which has prevailed to the present. The dualistic concept also created experts and authorities, educated in different subjects, to define, select and decide in the conservation field.

Svahn-Garreau exemplified the 19th century restoration by Viollet-le-Duc who wrote about the will of modern time to accentuate history. 'Our era and our era alone, since the beginning of recorded history, has assumed toward the past a quite exceptional attitude as far as history is concerned. Our age has wished to analyse the past, classify it, compare it, and write its complete history'. He worked with meticulous documentation to perform a kind of conservation where old buildings were restored in the way he thought they should have looked. The Swedish equivalent was Helgo Zetterwall. Style-restoration as well as pure preservation belongs to modern conservation in the heritage sector. All is

included in the mindset of ideal truth and ideal authenticity which Ruskin in England, Viollet-le-Duc in France and the great Italian theoretician Cesare Brandi were discussing. They had no doubt that authenticity could be found and preserved but argued about what this authenticity was.

The wars during the 20th century evoked the need for international conservation charters. The conservation community was mobilised and organisations created, and conferences were held. The Haag Convention for protection of world heritage in armed conflicts came in 1954. The Venice Charter was formulated at a great conference in 1964 where all Western countries were assembled. The World Heritage Convention signed in Stockholm 1972 is a result of the Venice Charter. It states that a world heritage should be investigated by experts who define the object's universality, authenticity and integrity. It should have OUV, Outstanding Universal Values and represent 'a master piece of human creative genius' that is of value for the whole world. These historical phases form the background.

Values and valuation: The universal values regarded as self-evident have been questioned in the late-modern humanistic debate. Denis Cosgrove wrote in an article 1984 'Why should we all take it so seriously?' Cultural values were more and more criticised and a kind of crisis occurs on the issue of value. The existence of an inviolable artistic value and an essence of art that makes it worth preserving are questioned. In the contemporary philosophical debate there is no universal, eternal value since it is a construction defined in every time and place, and furthermore most often defined by a power as part of that power. It is largely Foucault's theories that dominated the debate during the 1980s. These things need time and they are still not established everywhere within the heritage sector, and older mindsets exists parallel to newer ones. The classic norms of reversibility and minimum intervention are also questioned. The expert-led universal evaluation is considered a male hegemony that has created a so called canon. The concept of objective authenticity is questioned - if it is possible to achieve at all. The critique concerns the essence of art as well as the scientific search for truth and source criticism. It is all a construction and created by man and hence subjective.

One of the earliest documents on valuation during this period of questioning is the Australian Burra Charter of 1979. It is a document with basic principles that can be adapted to other countries. The content can vary but it must relate to the basic concept and mindset, and rather than static, it must be desgned for change. It consists of a process in which the users who relate to a place should be involved. It can also be seen as representative for the transition phase between the Venice Charter and the contemporary debate. In Sweden it was not until 1988 that KML, *Kulturminneslagen*, came into force, containing the notion of cultural historic value which was much discussed. Within ICOMOS, which administers world heritage issues, there is an ongoing debate between innovators and traditionalists, which is a simplification, but there is an internal debate within the heritage sector that originated with the Burra Charter.

The risk issue is part of the sociologic discourse about society and how it changes when industrial modernity, and the production of wealth transitions to reflexive risk modernity, in which risks are managed and security achieved. This also affects the view of values which is seen in contemporary conservation document consisting of risk management and preventive actions. The mindset is also included in sustainability which is about damage management and risks encountered in modern society through human activity. There are new organisations for risk management and preventive action e.g. PRECOMOS, for 'preventive conservation'. The sociologist Anthony Giddens might describe it as a part of this expert community to avoid risks, which is part of our late modernity.

What happens then with the values? The few experts defining them earlier are now many and they act differently. There is openness and a transparency with discussions and reasoning and authenticity

is not clearly defined, but changes from place to place. With the insecurity of interpretation of values opposing each other there is a need for models to discuss them. Svahn-Garreau mentioned Michalski's three-dimensional model and the Getty Conservation Institute and their work with different value descriptions in big international projects aiming at processes that include people.

***Critique and discussion*:** There is an ongoing and increasing critique from academia about the conservation field, a discursive practice with many articles that has exploded the last five years. There is e.g. Laurajane Smith from Australia who discusses "Authorized Heritage Discourse", AHD, a concept where selected cultural heritage is included in a description of discourse, in which the power rules over the little people but where one also wants to increase the representation and participation in the democracy. She criticises the Burra Charter, and asserts that it is a false chimera of participation. Critique is also directed at the world of cultural heritage which has developed into an industry turning everything into commodities, demystifying the interesting, and diminishing the cultural historic values. Negotiation and inclusion has been added into the Burra Charter's Conservation principles as a part of the process and the valuation. There is a value conflict and in the negotiating situation all stakeholders, owners, the public and the experts must be included to discuss, prioritise and decide.

Svahn-Garreau proceeded to mentioned that this has impacted the National Heritage Board in Sweden who started the project and narrative model named 'Valuation and selection' and talked a lot about it. One critique against the narrative model is that it almost neglects the experience value, the artistic and architectural. Fredengren and Genetay, who managed the project participated and presented the narrative model at Workshop III which is summarised above. Svahn-Garreau also mentioned the debate on story-telling, which is also used for commercial purpose. Narrative models can be used in many ways and a non-commercial use for organisations is presented in the summary of Workshop VI below.

One comment was that the shift opens up for more subjective valuations and Svahn-Garreau answered that it does. Everything is subjective and everything is constructed, but the user value needs to be considered along with existence value. The user value of a site emerges from people using the site, but the existence value is not dependent on any person using it. It is an intrinsic value.

It is not only a critique from academia against the cultural heritage phenomenon and the heritage sector, but also from practitioners, architects and planners, actors and politicians. This way the value is disassembled. The academic debate is still to a great extent, concerned with repealing the dualism between nature and culture, but not so in practice. There is of course collaboration in practice, but more seldom the cooperation resulting in the kind of synthesized work that the academic debate advocates. There is also a debate where energy opposes preservation. What results in the largest ecological footprint? Should we save or demolish?

***Questions concerning practice*:** Svahn-Garreau was asked if she had any experience of how bigger real estate organisations relate to the issues and perspectives she described. Her opinion was that there is a lack of knowledge. There is user involvement in bigger renovations and models for this, but these are aimed at engaging people in the process and the changes, and about their desires and what they miss, not about the understanding of a place and its history in a wider perspective.

Furthermore, descriptions of social consequences were suggested as a possible model and Svahn-Garreau was asked if she had connection or experience of it since there is a kinship. She answered that the tool is used at Thyréns, and at White too, but the heritage sector had not made the mentioned connection. The difference is the historic perspective within the heritage sector. The group concluded that it must be important, or a kind of objective, to merge the various discussions. There must be an

economic gain for society in doing this. If we have these parts; people's identity, a history, a social place where people grow up and feel secure, why then could it not be intertwined, instead of working in parallel and come to different conclusions. This could be turned into real development.

Svahn-Garreau agreed with this and finished by saying that the conservator could have a more social role and work from a bottom-up perspective and engage locals. This is already done in the U. S. where it is a part of the social movement and this tradition is transferred into conservation.

14.5.5 The architecture of the home

Ola Nylander, architect and professor at Chalmers lectured about architectural quality in general and in dwellings in particular, and how to analyse and assess architectural quality. Nylander's special field is quality and architecture of the home. He had chosen to talk about a project where this knowledge had been implemented in practice.

Quality in architecture has changed historically and the answers to the question 'What is a home?' have constantly been changing. He summarised this change during the 20th century, but also referring to the different flats and houses of various ages in which he had lived. His personal experience of quality changing constantly depending on the family size, phases in life etc. showing that quality is both historic and personal in different ways.

As a PhD candidate he tried to explore that tacit knowledge that exists among architects when talking about the quality of a home. Architects use concepts that are usually agreed on but are quite difficult to convey to others. Nylander conducted a number of interviews with residents and architects to figure out what this quality is and he developed a concept. There is nothing new. It is about putting words to something already existing and about tacit knowledge. The concepts do not describe the actual qualities but are needed to discuss quality. After he finished his thesis he has written some books, published also in English, and he has made many housing surveys.

The Viskafors project: Nylander highlights material, detailing, and care which is something often encountered when talking with residents about housing factors. The character of the room, how daylight is distributed, how one as an architect has formed this, how the room can be used in different ways, generality, connection of space such as axiality, how one moves in the rooms and how they are organised. Now as a practicing architect he was about to challenge the concepts by implementing them into practice. He was appointed by a small public housing company that had received a proposal for passive houses but the executive director, Bengtsson thought that something more was needed in the passive house concept so he visited this small municipal district. There lived 5,500 people but the main industry, the manufacturing business had been outsourced and 1,500 jobs were lost and there was no confidence in the future. All public housing companies have a 'third task' to develop a town or area. The question here was whether to close down the business or go for it?

The public housing company started to refurbish some of their existing real estate properties instead of demolishing. They even started to plan for new buildings and Bengtsson realised that something special with high quality was needed to attract people to move there. Nylander's assignment was to create new houses that were so attractive that people chose to move there.

Identity and borders: Nylander and his colleague investigated the points of departure. The only possible location was in the woods so people moving there should have some kind of relation to the woods. An idea grew from the clearing in the woods about a community in the woods inspired by Sören Olsson, sociologist, and his book *Det lilla grannskapet* describing how people need the small scale together with society at large. The project they made was a small community of 18 houses, but divided so that there were always these small parts in the large part or the whole. They

call it the small community that builds the large unit. The idea was to start in the small parts with a gradually expanded scale to make people gradually feel more at home. Eventually one gets a sense of belonging to the whole area. They focused on the boundaries to create a relation between the public rooms or spaces, between the houses and that which is private, on the other side, towards the nature. They made very accurate descriptions of materials to distinguish the boundaries. They worked with materials that change when one is approaching the building. They furnished the room with different things to create these different borders.

According to the National Police, security is always a property which is highly ranked quality in any valuation of the home. Security comes first, second and the third. This does not primarily concern locks and alarms. Instead it is the scale, possibility for orientation and to have an overview of the neighbourhood. To see what is private and public is important for feeling secure.

General spaces: Generality is also important when discussing the quality of the home. In old houses one can find all the things that matters. It is about layout of the plan. Nylander showed an example, Eskilsby, with big rooms that were not determined by function. With the same dimensions in the rooms, they would suit different functions. A dining room could be a bedroom or vice versa. The possibility to use the house in different ways is important, and to choose which part to be private. It is about leaving the decisions to the residents, those who live there. They also elaborated on enclosure as a quality. There were different rooms that were more or less open, more or less closed. Rooms have different 'bubbles' one should 'feel' the room, which could be hard for a layman, but it is very significant that a room always has a support somewhere and by showing the thickness of the walls it increases the sense of enclosure. In an enclosed room the massing of the walls becomes visible in the beveling of the window niche, and the next room is open with large glazed doors connecting the inside with the outside. One should have both – that is quality.

Daylight: Distribution of daylight is very important and Nylander mentioned the BO93 housing expo in Karlskrona as an example of good natural lighting and distribution of it. In Viskafors they tried to combine the qualities and values found in older window design with new energy demands. They could see how the daylight altered when the ceiling height increased and what happened in the window niche when the light hits these glossy painted sides by using simple sketches, and all differently designed window details creating a play of light and shadows. There is a knowledge about this which has been forgotten. Daylight entering a room from the outside can create a room within the room. Low placed windows are also important for adjustment to the higth of a child or for the possibility to lie down while looking out of the window or just sitting on the sill.

Axiality: Traditional chains of contiguous rooms also give qualities when standing in one room looking further ahead. One can discern the daylight coming in but not know exactly from where and moves forward to explore it. It is important when entering to get a view through, out to nature and other lines of sight through the chain of rooms. It can sound a bit trivial but it is pretty tricky to plan for it, or convince clients of the value of this quality. Every room must have two doors to avoid ending up in a room like in a dead end, but instead create a flow of movement for discovery of the rooms. It is about taking architecture in possession through movement.

Materiality: They chose to work with natural materials and with craft, wooden floors, and wood studs, and white-stained wood to create a sense for quality and to avoid destroying the materials with plastic paint. It was important to choose material that lasts over time to reduce the costs for maintenance. There were rules to consider for this project and LCC, life cycle cost calculations were very important for the decision making. They chose a roof of Rheinzink which was much discussed, but they got 75 year warranty on it which determined the choice. In the future, when the roof is

replaced, it will be possible to reuse. The façades are wooden and have been pressure treated and then boiled in oil for long uselife. Bengtsson calculated that the houses will cost more to build but the really big costs are those occurring over time for maintenance and operation.

14.5.6 A complementary survey

Dennis Axelsson, Head of Department at Heritage Halland informed about a new survey directed to owners of registered properties with cultural historic values with the aim to map the owners' views on this value. They had just begun to look at the statistical data, but were able to see some interesting facts already. Eventually when they have made their conclusions it will be published.

They started with the selection of over 10,000 properties to get a manageable material. The selection was based primarily on getting as many different categories of buildings and uses as possible. They sent the survey to 3000 owners. Information about the big Halland inventory was attached. They got 1000 answers. Over 90 % of those living in or using this kind of building with cultural historic values considered it as a great asset. This was a strikingly high number, indicating that people purposely seek these kind of buildings when buying a house.

One of the questions was if they could consider paying more for owning, living or using this kind of properties. As many as 65 % of the 1000 respondents were willing to pay more to live in or use a building with cultural historic values. Over 20 % responded that they would be willing to pay 10 % more for this. As many as 41 % of those who answered yes could consider paying 20 % more to live in or use this type of building. This is quite a lot if one buys a house for 2 million SEK.

A comment was about how important it is that the estate agents can take part of the results. Axelsson agreed. They have been thinking of how they can get in touch with all those who actually do not care about what kind of building they have bought. They want to pass on the information that, according to the answers from the survey, they will actually decrease the value of the house if they replace the old windows e.g. with aluminium windows. This could happen because there were many buildings with class C in the inventory which is the largest group and comprises the more common buildings. The high response rate, about 33 % could lead to the conclusion that people really care about their houses. Axelsson answered that they had been very careful to inform that the survey had no commercial purposes, which might have contributed to the high response rate.

There was a small discussion about there being other experiential values besides those of preservation and authenticity, which can be equally important such as architectural values. It is simply more complex.

14.5.7 Discussion

An interesting summarising discussion concluded the day. For the discussion some questions had been formulated and were handed out.

1. What values do we put into the buildings and what way to assess should be used for understanding of the whole?

- from an energy perspective?
- from a conservation perspective?
- from an architectural perspective?
- from construction perspective?
- from a user perspective?

2. What approaches and ways of assessing properties and values can we use, and which ones work in practice?

3. Can everyone's interests be met?

4. Can any of the perspectives be considered to weigh heavier?

Values and uses: The discussion started with defining that there are values and properties that are not necessary connected to the commercial view of values, but can still be valued in economic terms, which Axelsson's lecture had showed. Really good quality in a building may also be relevant to costs i.e. give lower costs which is positive from management perspective. Good architecture also has undisputable qualities that were shown in Nylander's lecture.

The commercial aspects was further addressed from another angle. Tourism has increased heavily in Sweden and cultural environments are an important part of that context. If we can continue preserving our cultural environments it will be an economic contribution to society as well. We do have a fantastic culture and cultural environments that we have preserved and also pure nature experiences. Sweden is developing into a destination for nature tourism. Our nearest *Naturum*, centre in nature reserve, which the Environmental Protection Agency administers is not far from here where wilderness is just around the corner. To get access to this is invaluable for e.g. a European living next to a motorway or a big city.

On this followed a discussion about how the built environment is valuated. The National Heritage Board´s narrative model was tested to see how it differs from the traditional expert valuation, and the citizen perspective is sometimes used when the longer-term expert way of thinking is left aside. Whatever the type of valuation, it becomes one-sided. Both sides are needed; a combination is preferred to get the long-term sustainability perspective into the valuation of the built environment.

The trading zone – pros and cons: There is a need for dialogue, a meeting and a kind of negotiation between expert knowledge and spatial knowledge so the different values and qualities represented by different professions and areas of knowledge may take place in the public environment. Both sustainability thinking and the heritage sector have a long-term mind-set. The Burra Charter was mentioned as an example where experts work with cultural heritage and simultaneously involve all stakeholders and even hand over responsibility for the management to some of these stakeholders. They are talking about a trading zone. There is an open debate about this.

Many parallels can be made also in the world of research or academia where discussions go on about what sustainable development is and represents. A new yet old idea about culture as a fourth pillar of sustainability came up since it otherwise is categorised as social sustainability and often neglected in management. If history is not acknowledged then one has failed with what is called sustainable development. It should be acknowledged even if it may involve difficulties such as conflicts. It was also discussed what culture is; ethnicity, immaterial culture, how rooms are memorised, the identity value in the relation between oneself and a place …

There is a lot to learn of this suggested meeting or trading zone because it is lifestyle or what we make of the material that becomes culture; not the building stock. It can be seen in relation to a notion like authenticity. Every era has an expression that reflects its society, leaving traces that should be preserved, but we must make some changes for the use of cultural environment. Everything cannot become museums. Public facilities must be made accessible for all people. There is a social aspect to the notion 'meeting' and how a place is used; it must be safe for people to use public space.

A comparison was made with U. S. where conservation officers learn how to work in a different way. One should identify all stakeholders in the building, bridge or area one is to workoin before starting the project. Everyone, not only those in the heritage sector should be included. There is a more open

discussion, and it is always better to lift all issues into the agenda from the beginning otherwise they eventually show up like a jack-in-the-box without warning when starting the project.

This was found interesting, a strong idea. The citizens are the society – not the institutions, that is a big difference. In Sweden one is used to everyday life is being taken care of by civil servants. In the end it is hard to know if the citizens have more power there than here, but the very idea that one should talk to people is good.

One objection, with a church as an example, was that someone also has to see to those who have preceded us and those who will follow. The long-term perspective may not be perceived as important by a layman in the area. An objection to this expert view was that all are stakeholders and users of the built heritage; the parish, conservation officer, art historian, the expert coming from Denmark to study the lime paintings, tourists – all are part of the trading zone and of the user perspective.

One comment was that it is always difficult to know how to relate to big changes e.g. in examining building permit applicatoins. There are always different claims on accessibility e.g. In twenty years there will be other buildings and the claims will also have changed; the different claims will always somehow be put forward. It is a tricky question and no conservation officer today can know how a conservator's valuation will have changed in thirty years. It has demonstrably changed since Curman's time and it will continue to change.

Valuation of properties – weighting or balancing: Next question put forward was a rhetorical one, asking why we have buildings with the answer that we have to use them. That is the big conflict; use or preservation. In economic terms the use value is the important one. Looking at the classifications the C class is the most interesting while the B and A classes are considered as time documents of museum character where authenticity and patina are ranked higher than use and money.

Further, there was a discussion on valuation systems with weighting. It is problematic when trying to weigh culture against energy and money. Money and price are something that is negotiable, and one can just listen to an estate agent to realise this, hence, one cannot talk about economy in association with buildings. It is not a rational measure, but an idea about it being important. In a system where one can weight different values and properties – can one then disparage a cultural value, to give it less weight against economy, and thus gain a very good economy instead? Sometimes it is a question of priorities when sometimes there is something to do and sometimes not. In weighting a definitive value is set e.g. 0.4 or 0.5 which has to be adhered to. There was a great scepticism to the whole idea about this kind of balanced weighting which might be much trickier than one imagine. Looking at kilowatt hours one knows what one gets, and in economy one can make LCC calculations and know what an investment gives back, but if one should weigh this against the design or cultural values, one can end up in quite strange optimisations.

In this case the trading zone where all stakeholders are involved can be a great advantaged, but what is still needed is a dialogue with argumentation, and for this one need a conceptual apparatus and a language.

The question about meeting everyone's needs and interests is difficult. The only answer is that sometimes they can be met and sometimes not. The questions about *when* one has to prioritise, and *what* to prioritise, become more important. Different perspectives have different weights but are not constant. They weigh different in different contexts. It is difficult to know which values to choose for understanding the whole. For an ordinary buyer of a house the user value is probably seen as a priority followed by the energy bill and cultural values are probably seen as part of the design.

After this followed a story that is not reproduced here, but the gist of it was that something which is indestructible and untouchable can be seen as a provocation, it makes people feel left aside when they cannot or are not allowed to discuss or argue.

Views on the user side: Then there was a discussion about the individual house and examples. There are no 'solutions' but there are methods applicable to individual buildings, or rather ways of working, or approaching the problem. There are good examples showing that one actually can accomplish something good. If one could show something that is good from all aspects it would be very interesting. The good example is always good but one has to choose them carefully. This is also a problem and a pedagogic question about clarifying and explaining. The best would be if there were examples of class A buildings and class B and C as well to show that all buildings are important according to *PBL (8:17)*.

If one looks at it from the other end, from managing building permits, it is very important that people get information at an early stage. It is not unusual today that people exchange their windows for new plastic ones in their 19th century houses and the local housing board consisting of laymen approves of this. There is a need for stronger legislation where a board cannot override what the law says as happened recently when a board decided to demolish an A class building. The legislation was discussed and it was suggested that the members of the boards should be educated.

Legislation and methods for valuation: The discussion continued with what the professions with the different expertises could do together on the energy issue and the climate issue. New energy demands are expected and the risk if specific energy demands come too fast is that measures are carried out that could meet the demands in the short term and that the longer perspective and the quality issue are neglected. The same situation could occur as in the 1970s. How can this be delivered for a greater awareness of those in charge? Nylander's example came up as a good example and it admittedly pertains to new production but more clients of this kind are needed. The economic part was also mentioned, the management perspective and the lifecycle perspective. The embodied energy is seldom included though, in the latter. LCA is not much used even if many managers today use LCC calculations.

The National Board of Housing, Building and Planning and the National Energy Agency have been commissioned, until 2015 to investigate and present what one should do to achieve the climate objective for 2050. One does not know the division yet, where it lands, how much should be made in the existing built environment and what ends up as demands for new construction. They expressed concern over what it might mean in practice to use the weighting of a building´s different values. When something is formulated in words it is definitive, while figures can be seen as a price on something. Figures are good for comparisons and the different alternatives but one must be sceptical about it used as a definite requirement system. It was stated in this context that inventories of built heritage really are needed, but how is this work to be realised and how is this to be financed? The general demand for cautiousness in *PBL* is not enough. One has to have a basis for planning showing the existing built environment and that argumentation is needed for a more reasonable legislation regarding existing buildings.

There were further comments about valuation models for comparison of qualitative and quantitative methods with equal weighing. One can also choose another point of departure with the qualitative values as a basis for the quantitative, which would work. It was also pointed out how many times the issue had been mentioned during the discussion as a whole, and how important this tool for analysis is for the argumentation of what values are stable, or constant, from a preservation perspective, and also that there is a need for models for comparison. This is a possible way forward.

One comment on this was that in many cases it will not be a question about what to preserve. Instead it will be about what one possibly cannot remove. There are already projects investigating how bad it will be based on different energy requirements. The kind of research going on now may be an argument for an adjustment involving more reasonable energy requirements. There will also be even more tough energy requirements for new buildings. It was pointed out that at the same time new buildings are a very small part of the total building stock which again made the issue come up about weighting the immaterial values of craftsmen's tradition and continuity.

Priorities: The focus on the object with all the different perspectives of, energy, culture, users etc. was left for thoughts about exterior and interior rooms and that it is also a matter of environments, and that one perspective is not more valuable than the other. Rooms have different qualities, to be used or to be cautious with and together they constitute an environment where there is a mix. This is one of the starting points in a new municipal Conservation programme. The buildings play a role but there are other aspects like structures and proportions in how they relate to each other, creating spaces. There are certain legible outlines that can guide in making additions to the built environment.

There are people living in or working in the buildings who should be in the centre of the weighing of values, and people need a good indoor environment. If there is anything that should weigh more in this weighing a good indoor environment should be decisive. Priorities of perspectives must vary from case to case but people and their wellbeing must always be a priority.

It was repeated that the legislation is worded vaguely as was mentioned earlier, but not for an official. For a layman it seems vague and he or she does not know how to interpret. It needs to be clarified and in a way that cannot be misinterpreted. To this comment there was a suggestion to expand the National Board of Housing, Building and Planning's series of handbooks to *BBR* with one about buildings with cultural historic values. The handbooks have descriptions of how things could be interpreted. This was considered a good suggestion that it should be a new book in the series and with the same status for cultural values. It was also told that a few years ago when making calls to a number of officials managing building permits that they lacked and wanted guidance on these issues. There are already interpretations for *PBL* and past judgments to use, but this new idea 'would give a good tool' which was the last comment for the day.

14.6 Workshop VI — Testing of a systemic meeting

Workshop number VI was held at Chalmers *Villan*, and started with a presentation of the theme of the day; systems thinking and systemic thinking, collaboration and understanding, and how to carry out a systemic meeting. All three professions where represented; conservation officers, architects and engineers, and the leader of the workshop professor emeritus, Hans Sarv, an organisational consultant. Both academia and practice where represented.

14.6.1 Systemic thinking versus systems thinking

Sarv introduced the concept of systemic thinking versus systems thinking which is used in various ways. It is used in the logistics and development prospects at Volvo, in family therapy, and cities are regenerated using systems thinking. The starting point is always the same; peoples everyday lives. At the end of the day, it all comes down to peoples´ everyday lives, where everything lands. All organisational work, all isolated actions are accumulated in everyday life and becomes expressed, as an aid or a condition for people. This distinguishes systemic thinking, based on what people actually experience, from hierarchical systems thinking in which the basis is a planned reality about how things should be.

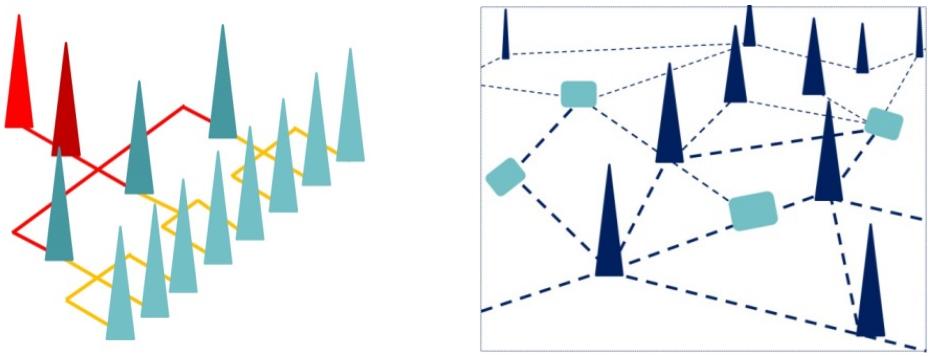


Figure 14.4 shows the different relations within hierarchical systems and interaction within a system.

In a hierarchical system work is characterized by discussing one question at a time in an agenda-driven meeting contrary to the systemic meeting in which all questions are discussed in the common dialogue. Figure 14.4 illustrates the basic relational difference. One takes a stand, here and now, in the common reflection and in the individual decision. It leads to a process of change. The basis is the same story where all can hear the others interpretations of the story. The roles become clearer; one puts oneself in a context, and becomes part of the same history. It is about building up a capacity, to interpret and transform into action the possibilities that emerge through the story, the different perspectives and the shared reflection. It is in fact the same as an innovation system. The systemic meeting reveals what one can do, because innovation and change is made by individual and personal decisions based on the actual everyday life and its events, and not by a joint decision based on a planned living.

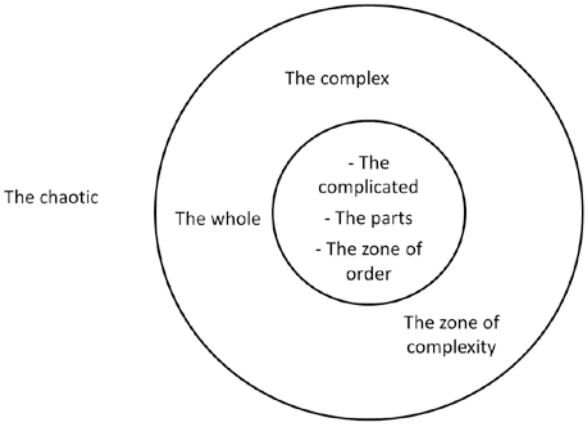


Figure 14.5 shows the hierarchical order and the systemic in their respective zones.

There are different zones to work in illustrated in figure 14.5. In the organising zone things are sorted out, one thing at a time, measuring, reporting, documenting, and decisions are made in an unambiguous common way. Working with the actual reality is another way of thinking, according to Sarv. In the complex we find people's stories and events getting individual interpretations, which is inevitable and desirable. There is no need for shared conclusions, everyone make their own, see their opportunities and make their individual decisions based on the shared reflection. One acts autonomous in a context, in a whole. This is more realistic since all organisations ultimately are based on individual reflection and learning. The differences are simplified in table 14.3 below.

The hierarchical systems thinking working with the complicated	The systemic thinking working with the complex
One question at the time	All questions simultaneously
Individual argumentation/shared decision	Shared reflection/ individual decisions
Focus on the PLANNED	Focus on the ACTUAL
Using the ACTUAL for feedback	Using the PLANNED for support
Argumentation concerning parts are based on investigations	Reflection concerning the whole are based on stories
The reductive view of reality which is captured by measurements, inquiries etc	Reality in all its messiness and complexity, everyday life as it is

Table 14.3 shows a simplified view of the differences that Sarv was talking about, to make the principles clear.

14.6.2 Discussion

An important comment to this was that the figure showing the two zones is a little too simplified. A more interesting figure would be to add the idiographic and the nomothetic and their relationship to the complicated, the complex and the chaotic. Sarv agreed to this and continued to talk about the third position where one has both a story and thus an experience and simultaneously has the knowledge about how to organise the whole for improvement of the topical event.

Some comments followed about the different ways of working with the anthropological aspects and how they are used by the market and within different organisations and also within universities. It is also a political issue and a question of society´s resources in general. The conversation continued with how systems issues had been in focus since the 1970s and the difference between the real world and the models and methods developed within the universities' different disciplines so the answer to the question about the usefulness of systemic thinking appeared quite obvious. In this case it is all about meta-theory and meta-modelling of how to get everything to work in reality. It is complicated managing people from different discipline areas and various faculty fields, and also the relations between those within and outside academia, getting everyone to cooperate and really understand each other. It can best be defined as a communication problem of epistemological nature.

Sarv mentioned the self-organisation found in networks that arise to engage in certain issues. Self-organisation is a concept in systemic adaptive systems. One could combine the self-organising power with a meta-analysis for creation of organisations that support and empower individuals. A meta-position is needed for an overview of the different levels, for creating a whole of the production system and the innovation system. It was then stated that it is thus a paradigmatic question in the end, and that one must be aware of which paradigm to use, one that enables change or one that prevents it.

A short comment was that systemic thinking is part of our work, but it may be that ideal conditions are very far ahead within the construction sector, which is steered by politics. We have been focused on new construction, and forgot to learn about existing buildings and conservation. It is thus important to get the actors to meet in the construction and management sectors. One challenge is that there are too many steps via entrepreneurs and contractors to the end user. Then there is a certain kind of general interest in construction. It is not only about individual ownership of properties, but part of the public. Through the climate issue there is also a responsibility to future generations.

After that followed a round or inventory of the systemic challenges within restoration and refurbishment where different professions like engineers, conservation consultants and architects cooperate. It was stated that in general the existing barriers have an owner. Students working for their

diploma e.g. want to study cases but companies do not want to publish their ‘problems’ and housing associations do not want to recognize deficiencies due to possible impact on the real estates' value. This may be why there are too few follow-ups on construction projects and renovations. We need more studies to draw conclusions about what works and what could be improved.

14.6.3 Systemic meeting for cooperation, understanding and collaboration

Sarv continued to explain systemic methodology and the structure of a systemic meeting.

Phase 1;	step 1 and 2	Observation; narrative and explorative questions.
Phase 2;	step 3 and 4	Reflection; patterns and choices.
Phase 3;	step 5 and 6	Action; alternative actions and acknowledgement.
Phase 4;	step 7	Management’s perspective; system setters.
Phase 5;	step 8	Reflection afterwards; the groups’ shared reflection.

Sarv went through the preconditions and emphasised that this was an experiment in a, for him a, new kind of sector or business. Phase 1, step 1, starts with the narrative, a concrete story, told undisturbed by the narrator. After that in step 2 the narration is clarified by *the system actors’* curious, explorative and open questions to the narrator. In phase 2 the narrator is placed behind an imagined wall of glass while the actors in step 3 try to find patterns of actions of the person or persons in the story. When one see where the patterns are and also has knowledge the choices become visible. Step 4 implies defining the choices made by the person or persons. Step 5 in phase 3 aims at formulating alternative choices and actions that could have been made, directed to the narrator. In step 6 the narrator is invited to acknowledge the actors’ suggestions and comment on them. *The system setters*, those who have a managing role in an organisation and add a meta-perspective, have been sitting, listening, behind an imagined wall of glass from the beginning but are now invited in phase 4, step 7. They can add their own questions directed to the narrator, comment the system actors’ discussion of patterns and choices but should first and foremost see what the system setter can do and also make proposals for actions that need to be developed in a long term, and which could be part of the meta-model for how this could be organised. They do an upshift of what they have seen and provide their thoughts about how this upshift can be performed, how the systemic methodology can be applied in this very difficult and complex business or industry. It is also of importance to know something about the narrator. The actors’ roles are central and they can only understand the narrative through understanding the narrator, from which perspective the story is told.

The narrative (step 1) The event or situation took place quite many years ago, during a conservation project. The event concerned the actual process and how the work was carried out. The object had been investigated by engineers and a design for the project was developed. There were two people from the museum working together as a team within the larger team. One was young, green and a graduate architect and had little understanding of the roles and the situations that arose, but saw the project work as an opportunity to learn more. The craftsmen at the construction site expected, however, direction of their work and the more experienced, and dominant conservation officer quickly took on the role. The green co-worker soon stopped participating in the construction meetings but the project was discussed between the two, before and after the meetings, which was a good thing, but the roles did not feel quite right. Thinking of the event or situation today it raises thoughts about the fact that project management was not part of the curriculum at that time about project management, and the accompanying question is of course if it is included in the programme for architects, engineers or conservation officers today.

The explorative questions (step 2) The explorative questions concerned partly how the mission at the time was formulated, the division of roles, other relations in the teams, how one should act today and how things are in project management, positions of power and a range of technical and conservation issues about the building and its systems, and the results achieved.

The patterns (step 3) The system actors identified patterns recognised through one´s own experience. The first comment was about the tendency to slip into technical details, where one has expertise and which represents a comfort zone. The experiences of the organisational parts and the feeling of uncertainty was something that all could recognize. The ambiguity in the role becomes uncomfortable. The expectations for leadership are linked to a responsibility, which in turn is linked to what means of power one has to exercise this responsibility. Knowledge was seen as a connecting theme; what knowledge is needed and what knowledge one is carrying in the luggage. There was also a thought about a 'clash' between the teams' expectations, leadership, and the scope of the project, to enable different professions to meet and interact. Reality and theory were not quite compatible.

The choices (step 4) The choice which was most apparent and easiest to identify was the green architect's; to lie low. Another choice was to not request support when other expertts were needed. The green architect was seen as a leader without quite realising it and thus did not give clear signals, was not consistent. This has to do with how formal power is organized and if one does not have the knowledge about this one cannot make a choice.

Alternative actions (step 5) The employer/client must provide a clear description of the assignment. It is also the employer's responsibility to be clear about the definition of roles and objectives. One should also have and maintain a clear dialogue with the other co-workers. The motivations to the different choices can be made much clearer to understand why they are made.

Acknowledgement (step 6) The narrator who had been quiet and listening was now invited to participate to give feedback on the patterns, choices and alternative actions that the system actors had discussed. The narrator could recognize the patterns and choices mentioned and confirmed that there were good suggestions for alternative actions; the employer's role, the clarification but also the individual responsibility to have a good dialogue with the other co-workers.

The management's perspective (step 7) The system setters had only listened and observed until now. One comment from a meta-perspective was that one after hearing the discussions can have the hypothesis that systemic meeting can be very useful in conservation work because it has showed a number of fundamentally interesting questions. It was stated, however, that a lot isrequired a lot of both the narrative and the questions if all the relevant information is to be clear, and some additional questions about power and principles for construction meetings were put forward.

14.6.4 Reflection and comments

The issue about management training was considered important for all professions, but at the same time the question was asked about *when* one is receptive to what is conveyed in e.g. courses in project-theory. It is not just about project management, but about process management, but what does that mean in this context? There is also a need for working across borders, to have a kind of understanding of each other's professions. One may already during one´s education need an orientation in how other professions' curricula ares designed, how they think and work, and learn some of each other's technical language to facilitate collaboration later in practice.

Another comment about systemic meetings was that one gets impatient behind the imagined wall of glass but it also gives the opportunity to think things through before entering the discussion. It was noted that the group in the meeting, despite the composition of different professions and with both

academia and practice represented, was a fairly homogeneous group. The degree of recognition in the narrative was very high for everyone in the group.

Other comments were that it might feel a bit unfamiliar to participate in this kind of meetings without working with it on a daily or weekly basis; it was hard to get a grip on the whole from such short narrative, and is was too easy to discuss solutions instead of how to act.

One suggestion about the meta-reasoning was to have more groups discussing the same matter to get different angles for a composed meta-model. It gained interest and further suggestions were made to arrange a meeting bringing together different professionals who all give their special view of the same object or building. Sarv could then confirm that there is a variant of this method that works very well in health care, so why not in building preservation projects?

Transferred to the building sector it would imply that every representative of the various sectors should give their opinion on a project or idea, followed by the views of the users, those who will live and work in the building, to hear what they want. Thus, it would be a form of user participation in the planning. The ideas developed further with a proposal to begin a project design with a round table meeting where everyone's ideas are put forward and all consider what precisely they can contribute to the project. It would be a kind of brainstorm opening that could be quite open in the beginning before going further. Overall, this was a very exciting day with many inputs that gave a lot to think about and that will be used in the continued work.

14.7 Workshop VII — Testing and development of the model; conservation officers

This very first presentation of the working model was made for conservation officers at Heritage Halland. Halmstad, to get feedback and an indication of whether it can work, if there was something that needed to be added or if there was something missing ands that should be included.

14.7.1 The basic protocol

They were positive to the logical structure of the model, but wanted to see it carried out in practice. The Chief Physician Residence at Spenshult, which was visited in October, served as an example for the first protocol. All three aspects are described briefly in that document, using public data, an energy declaration if available (or equivalent data), data from the newest Halland inventory, Data Base of Built Heritage, and a brief description of the architectural values made on site. Photos of the object are also added for the record. The question whether one can form an idea of the object, based on these limited data was discussed, and it was concluded that it should be possible to do so, at least with respect to the main features, the most important values, character traits and the building's general status. There is a cause behind the expression 'first impression lasts.' In general, however, the more detailed knowledge one has, the harder it becomes to distinguish, which characters are the most significant. This is a common known phenomenon. The most important thing is to get a view of what, if it disappeared, would completely damage the cultural and historic values. Conversely, it also becomes a way to get a view of those values that should be protected and perhaps even strengthened.

14.7.2 The valuation situation

There was a comment about what happens if two possible measures and their arguments appear to lead to negative consequences and are posed against each other in such a way that the only way out seems to be to choose the 'lesser evil'? This is a well-known situation for conservation officers and one way to, at least partly, avoid this situation is to choose a scale for the assessment with a clear boundary between what measures are positive or should be avoided. Another way is to go back one or two steps and reformulate the assessment or the suggested measures, or even to reformulate the objectives of the project together with the client.

Based on the protocol, possible measures were suggested for the object from a conservation officer's perspective, and these should be listed in a given order based on a template. This is made in a standard Word document so there are no limits on the amount of descriptions and text added. As a support, there should be a general list of advantages and disadvantages, risks and opportunities for actions and measures in the building and its systems. The chosen / proposed measures and their main features will then get a shorter annotation to be entered into an overview chart. The chart layout looks the same whether its title is architectural values, cultural and historic values, or energy performance, since all aspects will be compiled in the chart but a series of boxes may remain empty. The reason for this appearance is that one should already at this stage be able to see one's own proposed actions in a context. In the left column of the chart, there are a number of areas and aspects that can be affected by the suggested action. These should be taken into account to arrive at an assessment, and the measures should also be evaluated according to a four-graded scale.

1. High improvement of the building´s cultural and historic values
2. Improving the building´s cultural and historic values
3. Deterioration of the building´s cultural and historic values
4. High degree of deterioration of the building´s cultural and historic values

The idea of the four-graded scale is that one is forced to take a stand, and to gain an understanding of the consequences of the measures and actions.

After these three initial steps, it is time to compile the conservation officers overview of measures into the joint overview chart in which the engineer's and the architect's charts of actions are introduced as well. Conflicting measures and proposals will then be easily identified and this needs to be discussed thoroughly in order to take a joint decision on the choice of level of ambition and choice of actions and measures. In this work it is very important that the three professions have respect for each other's knowledge and experience. Maybe it is in this fourth step that the collaboration methods really can be helpful and make a difference.

14.7.3 Practical use

A long series of actions were discussed and written down in this workshop, all of which will be very helpful in future work. Everyone seemed to agree that the model must be tested in practice, and that such a trial will help to show if something needs to be changed or amended in the model.

This model is for the first phase of the planning process and will be followed by more detailed studies for the planned measures. There might of course be facts which make it necessary to change ones plans for the building, but the main results of this very first assessment is likely to persist through the process. What one gets are supporting documents to return to during the continued, remaining work if there is any insecurity about a suggested measure, whether it really is in line with the ambition and the jointly decided choices.

The advantage of this model, used in the very beginning of a project, is that any conflicts become visible at an early stage and this also provides time and space for discussion within the model's orderly frame and in orderly fashion. An expected effect is that the work will run more smoothly. These were the conclusions of the discussions and suggestions put forward.

14.8 Workshop VIII — Testing and development of the model; engineers

A presentation of the model was made in Göteborg at Chalmers for engineers only, academics as well as practitioners, to get response and indication of any advantages or disadvantages. The aim, the intended user and practicalities were discussed and it was emphasized that this was a first proposal

for the working model. The participants had received the different lists and charts in advance and were asked to give comments on the content. The presentation was held in the same way as in Halmstad at Workshop VII.

The importance of thisbeing a joint effort was emphasized, and that the indoor climate could be the common factor or matter that all three professions could agree on. The building is there for the people who are going to live or work in it and they should have a good indoor climate, which is especially important because we all spend most of our time indoors.

They had the same opinions as the conservation officers/consultants that the model would work logically but they want to see it working in practice. This was considered the best way of revealing if anything should be altered, removed or added. In this way the model could be refined. Otherwise the impression was that they thought it was a good proposal for a model. There were some different comments about it being interesting and, in fact, a new way of thinking.

14.8.1 Amendments

They had some suggestions for changes right there and they will be implemented; move control and regulation system and give it its own title. It was considered that it is an area of its own today and not something that is added here and there or just where it is needed. It should make it better adapted to the process and work in big projects today. It is usually special consultants that take care of and coordinate all control and regulating systems within the construction process. Furthermore, they wanted to see a list with advantages and disadvantages of various measures as a support when considering what actions may be appropriate in a specific building or project. It must not grow to be a whole ‘book’ among all other books, but the most common risks that should be considered can be written down. They also pointed out the need for explanatory texts to accompany the different documents as guides to how they should or could be used in practice.

14.8.2 Advantages

They could see and understand the advantage of the model, that possible conflicts or that which could be turned into a conflict if not taken care of, becomes visible so early in the process. They wondered about how potential conflicts could be managed but this part was not the subject for the workshop and the texts that could have been discussed were not finished at that occasion. Systemic meetings were mentioned, however, as one tested and proven method. Finally, they considered it to be a well thought out beginning; to provide an early start for discussions, and also to give it the time and space within an orderly framework and well defined form. They also acknowledged the advantage of the possibility that the collaboration could work better and smoother.

14.9 Workshop IX — Testing and development of the model; architects

This workshop was arranged at Chalmers in Göteborg, and only for architects, both from academia but also practitioners who had no prior knowledge about the project. This was a very good move because questions were raised which someone who is in the middle of something and preoccupied with it, would not necessarily see or discuss on their own. The focus was on the working model. The project was presented in brief before the model was discussed. The participants had received material in advance and the aim was to get their immediate response to the design and an indication of its relevance.

14.9.1 Use of the model

Spontaneous questions from the practitioners were about the client and his/her company’s role and about the users of the model, those who would benefit from it: and there must be a programme must it not? Secondly, as being practitioners they felt that one cannot suggest anything without knowing

who the owner/user of the premise is and what his/hers/their intentions are with the project because they are financing it. These were good questions and the answer to this was that the working model is intended for any company or municipality who has the professionals to use the model or intend to engage consultants for it and the idea is that the building itself should determine the degree of intervention. The collaborating professionals task is to investigate and communicate to the owner what the building can withstand in terms of usage, function and alterations, and of course how to meet the demands for both energy efficiency and cautiousness with cultural and historical values. The latter is a somewhat contradictory issue and a concern for everyone who plans for an extension, transformation or an alteration of any kind and applies for a building permit.

An opinion was put forward that the architect is entitled to make his or her own judgments, but the core idea of the working model is that all involved professionals should begin by making their own judgements and continue by comparing them with their co-workers' judgements and proposals. They also asked if the model should be commercialised and if the social perspective should be part of the model. The commercialisation of the working model is probably possible and the social perspective could certainly be added into as well as other important matters like accessibility which is another legal requirement, but the model must first be evaluated and then updated on the basis of the experience gained.

'Architecture is such a broad area that it is very difficult to tell exactly what it is' was another comment. This is a problem that has occurred several times during the project while trying to describe the area in the text. If one start from the premise that the architect mainly see to the totality and the context and then narrows it down, making simpler definitions, clearer and better, then it can be described was one answer to this. Another ability that architects are trained for is to see what possibilities a situation or a building holds within.

14.9.2 New suggestions

A joint comment was that this project is an important work, and a good thing that it is carried through. What had been mentioned at the other two workshops focusing on the model; that it should be tested in practice was mentioned here as well, which would be the best way to streamline the model. The clarity of the model is very important. "Maybe one could apply the model on one of the objects already investigated just to show how it is supposed to work" was one suggestion that came up. If there will be time for this and if three different professionals could be engaged for it, it might be possible.

A story was told about a project where a solution was suggested by the engineers and according to them it was a good solution, and how this was the way they usually chose. The architect trusted the engineers. The final result in the building was something very different from what the architect had planned and expected. The solution caused additional problems, and on top of that it was not a nice solution from the design aspect. It is never sufficient to just say that 'this is the way we do it, and always have done it'. That is why all suggested actions and measures must be explained, understood, and all consequences must be explicit.

The model cannot focus only on the energy issue; it must be a diversified solution where the question can be asked if it really is necessary to meet the energy requirement in a specific object/building. There were also suggestions to narrow it down to comprise only energy and preservation issues. Both options are possible, but the project is designed by an architect at a school of architecture, and the architect must participate on equal terms with the other professions if one should be able to talk about a transparent and horizontal, democratic work. So the decision to make a working model for the three professions, which was suggested in workshop I, remains. When the working model has been

streamlined a developed and updated version might include more aspects like accessibility and more professions. It is theoretically possible. Furthermore, it might be the architects training and ability to see totalities and context that could mitigate the conflicts, *if* such should occur.

There was a suggestion to work with indicators in the model and it might be a possible way forward. In one way the first part, the first inventory, is a collection of a number of indicators on what is good or needs to be looked into and where the possibilities are. Another interpretation could be to find indicators for the proposed measures.

A new target group for the model was mentioned i.e. housing companies in need of inventories for use as a basis for planning management and maintenance plans etc. There is a variant of this in a model developed at Chalmers but it is much broader. The working model in the EEPOCH project is aimed at pro-active work to get an overview on certain issues in the very beginning to get a good start in a project. Maybe the two models could be merged or, more likely, be complementary to each other.

***Reflection*:** What does the working model show? At the first overall inventory and discussions the possibilities and limitations are clearly shown. There must be strong *arguments* to weigh against each other. This work should form a basis for measures and continued planning. The very way it is carried out, the methods and approaches are aimed at and leading to greater *understanding* for the other professions and their perspectives, and also lead to a smoother collaboration. It is a pro-active effort to create a climate of trust and confidence for each one and thus also for the whole team/group facing the further work.

RESULTS

15 The working model for balancing of interests

Chapter fifteeen is about how to create a balanced assessment and adjustment of measures to each individual object, and how to formulate a working model that can be integrate into practice, by the knowledge base that has emerged. The basics for the working model are described; the protocols, charts and their features are explained as are the practical uses of them for the balancing process. Some thoughts about value and the working process follows. Information on a top-down inventory concludes the chapter.

15.1 How to make a balanced assessment and adjust measures to individual objects

Regarding the balancing of preservation of cultural historical and architectural values and energy measures the starting point is that there must be a way to deal with any contingent problems. One way is to develop a weighted score of both the different cultural values, and the value of energy efficiency measures, but that would be quantifying qualitative values. This is not appropriate because a phenomenon or a thing ceases to be what it is if it loses its quality (Starrin 2013) and this issue was also discussed in Workshop III, IV and V. A model to enable weighing the immeasurable values and qualities in relation to the measurable for an overall assessment is needed. The ability to identify any high quality is an acquired skill that is mediated through practice and acclimatisation in professional cultures (Rönn 2013). Considering the *complicated* status of a building, with all its constituent systems and values, and the *complexity* of collaboration, it demands a firm framework for the choices and the balancing that must be made today when a building is to be preserved, restored or refurbished. The firm framework should be a tool for the engineering, architect and conservation professions to manage the complicated physical parts as a complement to the idea of discussions and weighing of arguments for the choices and consequences.

15.1.1 Organisation

The building sector has its own structure: ‘The sector is project oriented, actors work in projects and for each project a new set of actors is established. A building project is also a complicated series of steps in which different actors replace each other.’ (Edén & Jönsson 2002) These facts indicate a need for a repeatable model that could work over time and provide a kind of stable framework for creating routines in this kind of occasional workgroups to facilitate continuity into the practices where people are frequently replaced.

We need a model to avoid one-sided assessments and bias, and furthermore to avoid an uncritical acceptance of arguments and solutions best suited for the moment. We need better and faster overviews of an object’s preconditions and the consequences of proposed actions and measures which were stated in Workshop I. This suggests a proactive model for use in the planning phase. A model for definitions of values, performance and qualities, and choice of measures must have a sound basis that is acceptable for all three professions. The mapping of all aspects should preferably also reveal which priorities might be made among the interests, considering the variety, and give guidance for practical use, for the balance and the decisions. All three interests must be considered, and all three professions must engage and contribute equally.

This could work in a smaller group or a team. Larsen’s *Teamutveckling* (2003) identifies some general characteristics for what could be defined as a team to distinguish it from other work groups. A team consists of people with different expertises collaborating towards a common goal. The team-members are individuals but simultaneously something else – something larger that can be described as a living self-regulating system in a societal context. In flat self-organising teams it is important that the different roles are allowed to develop, but it is equally vital that all the memebers know

where their roles start and end, their individual limitations. Normally a team will also develop a group identity, approaches, norms and roles if collaborating for a longer period. The members usually do not work together except in the specific project, and it is not routine work. The routines and norms are created by the team along the way. Teams are needed when something cannot be sufficiently performed by a single person, or to take advantage of a synergetic effect, or if the task demands a flat structure where several professions with different skills need to collaborate. The users of the working model are probably organised as teams. Comparing teams with communities of practice the latter 'do not have launching and dismissal dates' (Wenger 1998) which teams are assumed to have. In this sense, a community of practice is a different kind of entity than a task force or a team. The members of a team will come from different organisations where they have their own communities of practice, but the team will meet regularly face to face. The working model includes three professions but will gradually be elaborated and expanded with other subjects such as accessibility or economy, user involvement and more, and thereby also expanded with other professional specialists taking part in the process.

15.1.2 The professionals

When working with this new combined field, awareness and respect for the different professions and roles included in the process is crucial, learning from the Halland Model and the workshops within the EEPOCH project. Sometimes people have already been working with other professions in composed teams but sometimes not. In the first instance one has probably already found out or discovered where in the process that consensus exists and where the potential for conflicts exist. The model presented in this thesis is for use by experienced professionals. Making energy balances is a job for an expert just like assessment of cultural and historic values is, but some understanding of how the different jobs are performed may be a precondition for successful communication and collaboration among the different professions. All professions involved in construction work within the existing built environments should understand something about the other professions´ conditions, difficulties and the skills needed, simply to step into someone else's shoes for a while to see things from another profession's perspective. All have their own thoughts and skills which coexist and interact, but they cannot be explained by one logic or theory. There is a need to illuminate the different and multiple foci because what might be perceived as '[t]he same thoughts, become other thoughts when circumstances and contexts change' (Rosengren 2006). This is why hermeneutics and the initial meeting(s) described in chapter 16 are important.

It is about reflecting and consulting together, making everything clear and transparent so that no one can suspect a hidden agenda, and to base all decisions on facts, data and arguments which are seen as equally important, and equally valued, from the perspective of the conservation officer, the engineer, or the architect. The model will work as a supporting framework for decisions, to facilitate each member´s own ethical approach. The common principle or law within philosophy and logics about exclusion, *tertium non datur,* the law of excluded middle, cannot be applied in this model because buildings are complicated and people are complex: what is true for one building and one profession can be false for another.

Inspired by Nussbaum (2000) one can say that there is no generic procedure or algorithm for calculation of every individual case. One cannot mechanically arrive at the appropriate response: there is no generic description of a procedure for finding it. However, we can use general guidelines and rules that are summaries of others wise judgments. The rules are not sufficient, but most useful and often even necessary, and can guide us in a tentative way towards new views, understandings and

decisions. This suggests that the model should work as a general framework, firm but allowing the professionals to change perspectives for a new view or to re-evaluate existing ones.

15.1.3 Creativity and reactivity

To design generic models or methods is to design for the unknown in contrast to predicting the unpredictable, which in turn would be a vain attempt. Both *creativity* and *reactivity* are needed to make models and methods that really work. When using the model for assessments and judgements, the most important thing is to make judgments without being judgmental. The *creativity* part is about allowing oneself to break habitual ways of thinking and acting to accept that people have different views and values and that they still can find a common ground which makes the different views less significant and may even allow them to be merged. The specialist expertise must be there, but must not be supreme or in sole control. One could say that it concerns people's creative ability to widen their pale of understanding using an analogy from hermeneutics, which is a part of all sciences where there is a need for understanding according to Føllesdal et al (2009). It is close at hand while all three professions use equivalent ways to look for facts and interpret them. The *reactivity* is about responding positively to the others specialist expertise, being curious, and understanding and utilising the added value achieved through collaboration. The work in a team must be allowed to consist of order and be coherent, but also to be flexible, diverse, multi-layered and ambiguous. One must be able to calculate to manage the model itself, but also expect uncertainty to a greater or lesser extent. This uncertainty cannot be totally eliminated by estimates or assumptions. One just has to accept a certain degree of incertitude, respect the other specialists, and trust that together they can give a good overview of the object and its conditions and thus arrive at a balanced assessment of status and measures.

With the presence of the uncertainty described above, it is easy to fall back into familiar tracks and, for example, propose measures known to be good, acceptable and recommended from one´s own profession´s viewpoint, but perhaps without regard to anoter viewpoint that the team as a whole represents. This was discussed in Workshop IX. There must be an agreement, a creation of trust by transparency among others. Above all, creativity is needed to see the potential, to feel enough confidence to grasp and make use of the opportunities for creative acts, despite leaving one's own comfort zone. In total, creating new routines along the way (Larsen 2003) or a new *doxa* (Rosengren 2003) requires a combination of safe systems thinking: the homogenous, the universal as a framework, and uncertain systemic thinking: the autonomous, self-governing, the particular for the collaboration.

The universal is the reason that unites all human beings and can be formulated in descriptive terms which are often used normatively. It is also connected to the rationality and the empiric approach in the natural science, upon which the construction of systems rests. Universalism is usually homogenous when dealing with the comparable. The particular is the individual, specific, distinctive, all different characters. Particularism is usually heterogeneous. Universalism and particularism are not mutually exclusive. Conflict only arises when either party is given normative meaning (Liedman 1997). This is why a horizontal, transparent and democratic organisation is needed, where all professions are seen as equals and participate equally. One cannot, however, require participation, nor can one get it. One must work for it it again and again. The only things one may require, get or give are the conditions for participation (Jönsson 2013).

15.2 How to formulate a common denominator

15.2.1 Interacting systems

In architecture and construction many features and perspectives must coexist and interact. In the balancing we need to ask what resources, measures and properties we are dealing with. A building is a physical system with different interacting parts: construction, water use, electricity, heating and hot water, ventilation, and cooling. The parts must be distributed in separate systems and controlled by the users. The control and regulation equipment should then have user-friendly interfaces for adjustment of the system as a whole to the planned activities in the building. All parts should have the property of good functionality and the building should be accessible even for disabled people.

An existing building also consists of other aspects such as the documented values of its history and building technology, its patina and authenticity, and its historic values from societal, social and techno-historic perspectives. The building also includes the experienced values of art and architectural idea, its place in the context, its identity, the continuity of a tradition and its value as a symbol. All these elements should be balanced to achieve a totality and be optimised. This is complicated but linear, and complicated only means that it all can be identified and any problems discussed and solved. When working with buildings, thinking in systems is needed for organising the issues evolving in preservation and alteration projects, while system thinking manages the categorising, to get an overview and for optimisation.

Integrating the three perspectives and assessments in one inventory would be an advantage compared with a single assessment or energy audit. Taking into account both historic and architectural values together with energy efficiency is more appropriate for a building whose life cycle spans decades and sometimes centuries while the technical systems have a relatively short life cycle. It could provide a structured way of working with these three areas and an overview that is often missing.

15.2.2 Defining priorities

Of the different workshops carried out within the EEPOCH project, the very first was important for defining priorities of measures and actions. When a list of possible measures was compiled at Workshop I it appeared that almost all of the suggested measures were aimed at creating better indoor climate and comfort. This seemed to be something that all professions could agree on and has been guiding the following work within the project. An overall conclusion as to what makes a healthy indoor environment and climate in existing buildings does not differ from what is prescribed for new constructions. The most important parts are air tightness to avoid draughts and discomfort, control of relative humidity and temperatures, and last but not least the air change. These characteristics are desirable and applicable for any building, whether energy efficient or not.

The general priorities must accordingly focus on peoples' health and well being, the activities the building will house, and the its physical condition, which is the prerequisite of what measures it can cope with. A good indicator is the indoor environment and hence determining the buildings indoor climate should be in focus, which consequently has been written into the centre in the figure 15.1 below. This is the core that all professions could and should agree on.

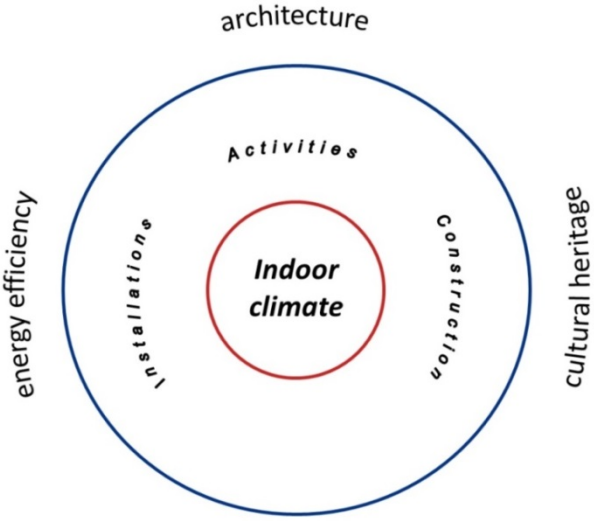


Figure 15.1 The figure shows the general priorities and common denominator.

Sometimes one has to accept that the building's energy performances is suboptimal, in order to preserve inalienable cultural and historic values, but still with a good indoor environment. This refers to good thermal performance and air exchange, adopted to and suitable for the people and activities in the building, and the building's ability to withstand moisture conditions without risk of damage, and without risk to people's health. This is more likely to happen in historic buildings with classification A, the highest rank corresponding to a monument like Tjolöholms Castle in the municipality of Kungsbacka, Halland, designed by Lars Israel Wahlman for the Dickson family. It was built between 1898-1904 in an eclectic mix of English Renaissance and Art Nouveau style and with inspiration from the English Arts & Crafts movement, with its love for authentic materials and high quality craftsmanship. It is Scandinavia's premier Arts & Crafts estate, comprising a whole village for workers, a church, a stud farm etc.

Sometimes one has to accept the loss of cultural historic values, due to a building´s physical condition and energy performance, in order to obtain a good indoor environment. Here too it refers to good thermal performance and air exchange, adopted to and suitable for the people and activities in the building, and the building's ability to cope with moisture conditions without risk of damage, and without risking people's health. It is more likely that this will happen in historic buildings without any classifications.

15.2.3 Context for the working model

There are many handbooks and guides on the three topics: energy audit, performance and management; assessment of cultural and historical values and management and maintenance of heritage buildings; and assessment of architectural qualities and values. However in the latter topic, architecture, the choice is more limited. Some guides are more commonly used in Sweden and together they show the context for the three professions' different fields, and hence also the context for our working model.

For assessment of cultural and historic measures, maintenance and management, and an overview of the roles of the conservation consultant and conservation architect in the design and construction processes, Axel Unnerbäck's (2002) *Kulturhistorisk värdering av bebyggelse*, Cultural and historic assessment of built environment, and Bernard M. Feilden's (2003) *Conservation of Historic Buildings* are of good use. For a comprehensive overview of theory within the Heritage sector Salvador Muños Viñas' (2011) *Contemporary Theory of Conservation* is very helpful.

For assessment of a building's energy performance and a list of energy efficiency measures Karin Adalberth's and Åsa Wahlström's (2008) *Energibesiktning av byggnader,* Energy Audits of Buildings; Enno Abel's and Arne Elmroth's (2008) *Byggnaden som system,* The Building as a System or *Totalmetodiken,* Overall Methodology, by Maripuu et al (2014) could be used, but the main source is the professional experience. For management and the building process Uno Nordstrand's (2008) *Byggprocessen,* The Building Process, is of great use. The process and organisation are described as well as management.

For assessments of architectural values and qualities Reinar's (2009) *DIVE-analysis*, Stenak's (2011) *SAVE* method for inventories and analysis of built environment or CABE's *Design Review* (2006) can be used. The *DIVE-analysis* developed in Norway mainly concerns the landscape and seems to work well for that use. The *SAVE* method developed in Denmark is for bigger geographic and urban structures and the result when using it are municipal atlases. CABE's *Design Review* was used and is described in Phase 1, chapter 5 in this thesis, and covers assessment and analysis of urban structures as well as experience values of a building. Together these three handbooks cover the whole range of architecture from landscapes to details in the design of a building. They do not give an overview of the architect's role in the design process and construction processes, but Robertsson's (2002) guide *Fem pelare*, Five pillars, does.

The literature or methods are mostly used only as an aid if the need arises and in combination with the professional experience from other projects, which is the main source of knowledge.

The table 15.1 below shows where the different actions for energy efficiency measures and preservation measures are located in the context of the building process. The actions and notions are gathered from literature in common use on the special topics. The balancing model is planned for use in the very first phase of investigation and planning. An existing building with cultural and historic values is treated much in the same way using the same methods as in new construction. In the new handbook *Totalmetodiken* (Maripuu et al 2014) Overall-methodology, developed within BELOK, the existing buildings are addressed. The book describes economically viable energy efficiency measures based on practice. It includes economic calculations and procurement, energy calculations and packages of measures, quality assurance and the different roles throughout the process. In Unnerbäck's handbook *Kulturhistorisk värdering av bebyggelse* (2002) Cultural and historic assessment of built environment, the assessment of values is in focus. An evaluation system for different criteria and values is described with different levels of protection and ambition for the preservation, but also a principle model for a sensible control of objectives and a consistent management. The main workload is carried out in the investigation phase, but the management phase is constantly on-going just like it is for a responsible energy manager. In the architect Robertsson's guide *Fem pelare* (2002) Five pillars, different approaches to the cultural and historic valuable buildings are described from five aspects: knowledge, cautiousness, management, approaching history and material and technique. The process always starts in the preparatory stage of the programme and the preliminary investigation of all of the building´s properties which constitutes the knowledge foundation on which all assessments are based. The different phases in working processes within the different professions do not differ much from each other. The comparison below shows an overview of some of the most common notions in use. Within the heritage sector the concept *alteration phase* is used instead of *construction process* in order to distinguish it from the constantly on-going management phase.

	Programme/ investigation phase		Design phase		Construction phase/ execution		Monitoring/evaluation	
Total-metodiken	Data collection energy auditing, energy calculations, calculations of costs	Package of measures, documents for procurement	Detailed design, plan for commissioning	Procurement contracting	Quality control, control of functions	Documentation	Evaluation of quality in maintenance and operation	Maintenance-plan and operational routines, planning for monitoring of measuring
Kulturhistorisk värdering av bebyggelse	Identification of Basic motive 1. Document values 2. Experience values	Processing Reinforcing and overall motive Valuation and balanced motivation	Choice of level of ambition for preservation and choice of documentation and level of protection	Programme and plan for future care, maintenance and management procurement	Follow up of alteration and preservation plan	Documentation, conservators' control	Maintenanceplan	Follow up of maintenanceplan
Fem pelare	Preliminary investigation and legal requirements	Programming documents	Proposal and description of consequences, quality plan	System and construction documents, procurement	Monitoring on the construction site, construction meetings	Documentation	Building historic compilation of documents, final inspection	Management documents
EEPOCH Working model	Step 1-6	Step 7	Implementation		Documentation		Follow up	

Table 15.1 The comparison shows an overview of some of the most common concepts within the different professions, and in relation to the construction process. The different steps within the EEPOCH working model are also added which show that it is a proactive model.

15.3 The basis for the balancing model

The following is *a brief description of the idea* of the working process, the working model, and the documents designed for the balancing process. The process concerns and is designed for owners of heritage buildings and the three professions: energy experts, conservation consultants and architects. The balancing process is based on four parts: mapping, analysis, prioritising and synthesizing. It is an iterative process in which the first part consists of the inventories or the mapping of three views: energy performance, cultural historical values and the architectural view. The second part is the analysis and the individual choice of measures that suit the building. This is followed in the third part by discussions in which all professions take part in order to make the necessary priorities. Finally, the fourth part brings on the negotiating and synthesizing to arrive at a joint decision.

15.3.1 Mapping

Each building offers its own combination of difficulties and possibilities, and therefore needs a proper or at least broader inventory. This is the first thing an owner/client has to attend to. Existing data from inventories of built environment with cultural and historic values and from energy declarations are used together with an assessment in situ of the architectural values and can be supplemented with a first estimation of the building´s physical condition by using an IR camera. To use the former two, inventories of built heritage and energy declaration, consisting of already existing data is a smart way of using resources already invested in. If no surveys have been made they can be ordered from different companies or be carried out by the consultants commissioned for the specific project. There are standard procedures to follow in this matter. The mappings are entered into the basic protocols. Altogether it gives a good overview, and serves as a sufficient basis for a first overall and clear assessment. This assessment must not be waived but can be extended with different in-depth studies if any particular need arises.

15.3.2 Analysis and choice of measures

The following part is to analyse the object to establish general priorities about what cultural and historic values, materials etc. cannot be demolished or altered without distorting the building´s character, and to formulate actions and measures that can reinforce the building´s inalienable and historic values. The same procedure applies to the energy issue. General priorities for energy efficiency measures are made based on the analysis of the construction and the building's different systems, and actions and measures that can reinforce the building's energy performance are formulated. A definition and analysis of the architectural values and qualities that are inherent in the building and could be enhanced or weakened is made. What could be developed or added? The general priorities are made and appropriate and suitable actions and measures are formulated.

The basis for this part is the cultural, technical and architectural assessments mentioned above. The three professionals' proposals for reinforcing actions and general priorities are separately listed, and also fed into separate overview charts. For future work, feedback and continuous learning, an assembled lists of general actions and their pros and cons – their risks and possibilities ─ can be made during the process to utilise the experiences gained for further improvement.

15.3.3 Prioritising and synthesizing

For the next two parts the three separate overview charts are superimposed or compiled into one. When this is done it become clear which measures and actions may collide. This is where the wider discussion and negotiating begins which needs respect for the others specialists´expertise, and where the arguments for the individual choices of measures are vital. The aim is to make a synthesis of all proposals that have been thoroughly analysed. The measures and actions could also preferably be

placed on a timeline or in a Gantt chart to show a sequence of actions during the processing. After coming to an agreement on the balancing of preservation, development and energy efficiency actions, a unified proposal is presented and discussed with the owner.

15.3.4 The documents

Explanatory texts accompany each document in the described process. This is the basic framework for the working model for balancing energy efficiency and preservation demands, and for preservation or development of architectural values or qualities in our built heritage. The major outlines and the possibilities of bigger measures become clear and legible when making the choice of measures based on the kind of initial and summarised inventory described above. This clarity is a great advantage that is almost not possible in later stages when one has gained an understanding of all details. Another advantage is the ability to return to the initial inventory and the basis of design, the arguments for the choices, to refresh one´s understanding of the programme brief and see it from one´s own perspective. One can also return to the documented overview chart, the compilation, where the direction for the project was decided on and agreed on together. It is an iterative process. These parts of the process – mapping, analysis, prioritising and synthesizing for an agreement based on a joint decision – are the most important ones throughout the whole process for comparing the choices and their arguments and decisions in detail with the overall objectives chosen for the project by the owner/client. Design is an iterative process. The aim is not only to facilitate the balancing but also to create a good work environment for the whole team. By using the different documents in figure 15.2 and 15.3 as a framework and thereby defining the process and the different roles a clear and sound work process and environment is provided.

	All	**The conservation officer**	**The engineer**	**The architect**	**All**
Documents for each object	Basic protocol for the collected data and assessments	Listing of actions and priorities from Unnerbäck's book among others	Listing of actions and priorities from Adalberth and Wahlström's book among others	Listing of actions and priorities from CABE's book among others	
		Actions and priorities added into a separate overview chart	Actions and priorities added into a separate overview chart	Actions and priorities added into a separate overview chart	Superimposed overview charts –processed and reduced
		Gantt chart for proposed actions	Gantt chart for proposed actions	Gantt chart for proposed actions	Compiled Gantt chart for decided actions

Table 15.2 showing the documents required for each object and the three professions' involvement.

Documents regarding all objects	An Excel-file where all objects are listed if there is more than one object	An assembled lists of general actions and their pros and cons – risks and possibilities – can be made during the process to utilize experiences and for improvement in future work

Table 15.3 showing documents regarding all of the objects and all professions.

15.4 Overview – who, what and where in the process?

The owner/client: The owner/client or his/hers representative/project manager makes initial contact with the professionals who are being considered for the project. The following are brief descriptions of the seven steps in figure 15.2.

Step 1, the first agreement: The professionals are informed of the initial needs or aim and objectives formulated for the project, and where applicable the owner might also need or want help to articulate them. The model is presented and an agreement/decision is made on using the model or other professionals are appointed. Decisions should be taken or reconsiderations made.

Step 2, the protocol for mapping: It consists of three parts that are already made by the owner or will be carried out by the professionals and compiled in the first protocol.

Step 3, the analysis and lists of measurements: This is a responsibility for the professionals. All three professions make their suggestions for improvement of the property from their perspective and document them in their respective lists. Causes and arguments for measures are also listed. These will be used in the discussions that follow. Decisions should be taken or reconsiderations made.

Step 4, the separate overview charts for prioritising: All professionals enter their proposals for the project in separate overview charts. At this step the consequences for all proposals should be considered and the measures valued along a four-graded scale. Decisions should be taken or reconsiderations made.

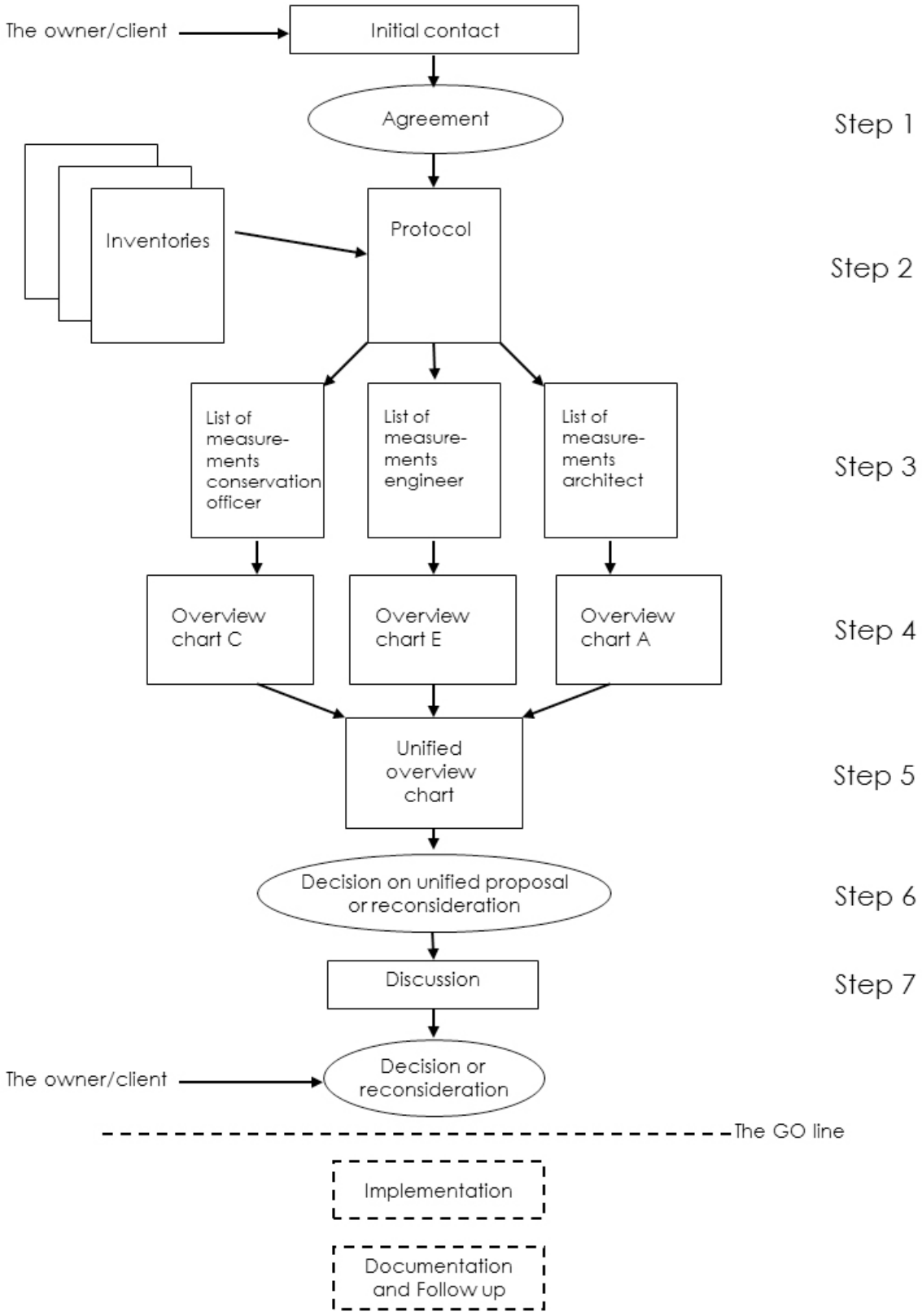
Step 5, the unified overview chart: All proposals from all three overview charts are compiled into one by the professionals. This compiled overview chart will clearly point out which proposals may collide and which proposals can be directly accepted. All proposals and their arguments should be thoroughly discussed and the valuations made should be considered from all three perspectives. Through discussion and negotiation a synthesised proposal is formed. If there still are ambiguities, proposals for deeper investigations should be put forward.

Step 6, the unified proposal: This is a responsibility for the professionals. To come to an agreement, make a decision on unified proposals, or propose further investigations, or reconsider.

Step 7, the discussion engages all: The results/chosen measures and their arguments are presented for the owner/client if he or she has not taken part in the earlier negotiations. Further investigations may also be discussed and suggested before taking any decisions. Any, or all, of the steps above may thus be reconsidered iteratively.

The owner/client: Decision or reconsideration

After the owner´s/client's decision the plan can be implemented, which means passing what is here called the GO line! The phases in a building process can be defined as *planning, design, construction* and *management.* The last phase has the longest duration and the other phases should be adjusted to it to facilitate a sustainable management. The model described is for managing the first two phases: planning and design. Implementation belongs to the construction phase. Documentation and the follow-up are important parts of both the construction phase as a quality control and the management phase, where the documentation is important for the maintenance programme.



Figur 15.2 showing the different steps in the process.

15.5 The process – when, how and why? – how to use the documents

The owner or client initiates a project to preserve, restore, refurbish or make some alteration or add an extension to a property. The owner/client has the legal responsibility for managing the process and the end result of the process, and should preferably be engaged and take part in the discussions at all steps. Real estate companies or housing providers usually have the expertise needed; otherwise expertise must be consulted. In small projects it may be the owner who manages the project, but it is common to engage a project manager to represent the owner. An initial contact made with the professionals: the conservation consultant, engineer and architect who are being considered for the project.

15.5.1 Step 1 and 2

Step 1. The owner may develop a brief for the programme in step 1 to present the needs, aim and objective to the consultants as prerequisites, or the owner may engage/commission the consultants for this job. The working model is presented and if the parties agree on using it the second step, the inventory, will give a good picture of the building´s condition from three views as the basis for adoption of measures. If they do not come to an agreement, the owner must reconsider.

Step 2. The special protocol that is used in step 2, showed in table 15.4, 15.5 and 15.6, when gathering all data about the building is a necessary compilation of inventories and inspections to facilitate the operations that will follow. The inventory protocol, consisting of the three different perspectivesof the conservation officer, the engineer and the architect, could be compiled by anyone of the three professions or by the three together. The object considered for an investigation is likely to already have an energy declaration or have been assessed for its cultural and historic values, or both. It is less likely that an assessment of architectural values has been made, so it must be planned and performed.

Inventories of cultural and historic values in our building stock, if they exist, are usually available at the municipality administration's office. There is also BeBR, a database where buildings with historic values are registered. The National Heritage Board, *Riksantikvarieämbetet,* is responsible for the database, which is slowly growing from year to year. The buildings that are assessed as having cultural and historical values are protected by laws and regulations, which are described in chapter 10. In Sweden there is a tried and tested method for assessing the historic values which is also recommended to use for buildings that will be entered in BeBR. There are also certified specialists for control of the cultural and historical built environment.

The energy declaration is carried out by a certified energy expert and reported into the database *Gripen* which *Boverket,* The Swedish National Board of Housing, Building and Planning is responsible for. The owner of the building also has the declaration. The work and procedure for doing the declarations, including the certification of experts are regulated by the laws, regulation and mandatory provisions described in chapter 10.

There are no official Swedish national, regional or even general guides on how to assess architecture specifically. However, there is one piece of advice about what really matters and it can be formulated as a question. Values are defined by a multitude of properties, possibilities, problems and contextual limitations. Which of them are so important that the building would be transformed into something else if they were lost and start a new discussion about architecture? Architecture is officially judged by the regulatory framework for the building sector, and laws, regulations and mandatory provisions must be met.

The Basic Protocol of Compiled Inventories and Inspections

Signature_____ Date_____

BASIC FACTS	
Object	
Name of property (and number)	
Municipality	
Owner	
Year of construction	
Year of restoration	
Use / function	
Construction and façade material	
Insulation, type/placement and location	
Windows, type, 1-,2-,3-panes, coating	
ENERGY PERFORMANCE	
Energy use, heat and hot tap water	
Heat source	
Distribution	
Electricity use	
– whereof for household/occupational (business)	
– whereof for running of the building	
Ventilation/type, quantity i.e. air flow/air exchange OVK (ventilation control)	
Cooling	

Table 15.4 The basic protocol used for the overall assessment, 1/3.

Local fireplace	
A_{temp}, m^2	
kWh/m^2, year	
Reference value, BOVERKET	
Energy declaration	
COMPLETED MEASURES	
Building; construction, material	
System; heating, ventilation	
Other/comments	
CULTURAL AND HISTORIC VALUES	
Conservator	
Preservation classification 1, 2, M	
New inventory, 2010, classification A, B, C	
Document value, historic properties: Building history; original material/patina, construction/building technology, design/architecture, technical-, societal-, social-, and personage-history values.	
Experience value, aesthetical and socially engaging properties: Architectural/artistic, patina, environmental, identity, continuity, tradition, symbolic values.	
Overall/reinforcing motive: Authenticity, quality, legibility/pedagogic value.	
Other/comments	
Function, residential/ work environment, real and perceived/experienced	
Environment, figuration, "gestalt"	

Table 15.5 The basic protocol used for the overall assessment, 2/3.

Architecture, design	
Other/comments	
MOISTURE PERFORMANCE	
IR camera	
Calculation	
BALANCE	
Cultural environment – choice of level of ambition for protection/preservation	
Energy – choice of level of ambition for action/intervention	
NEW MEASURES	
Cultural environment – possible preservation and measures	
Energy – possible intervention and measures	

OTHER

PHOTO

Table 15.6 The basic protocol used for the overall assessment, 3/3.

15.5.2 Step 3

Step 3. In the third step the three professionals study the object and make their proposals for what to preserve and how to do it: proposals for energy measures, proposals for preservation of values and enhanced or added architectural qualities. The inventory from step 2 is the basis for a review of the earlier actions and for new possible actions. Is it possible that the building can fulfil all demands in laws, regulations and mandatory provisions when applying for a building permit? Priorities are needed, but making a priority also contains the risk or possibility to deselect something else. It is important to define what enhancements the suggested measures can lead to, and also what they could do for the present and future users, but also what there is to risk. A discussion takes place for determining a reasonable or preferable level of interventions from the collected data, assessments and priorities. Decisions should be taken or reconsiderations made. It is important to remember that all proposals depend on the prerequisites given from the owner/client – or if no prerequisites were given, the proposals will be presented to the owner as suggestion for a programme to discuss, consider and decide on.

When filling out the form or list of measures, based on the collected inventories and inspections, one should also write down, to document, the motives and arguments for the chosen measure. The list with necessary headings is illustrated in figure 15.3. These motives can be compared with another profession´s motives and discussed. Not only the motives but also the causes and arguments for carrying through the chosen measures should be documented. These will be helpful in the steps that follow. Compile the three lists of priorities and actions, motives and arguments, pros and cons, into one list. This assembled list will be very valuable and of good use for improvement in future projects.

There is already a long series of handbooks, guides, methods and special literature within all three areas and the aim of this thesis is not to add yet another guide for one of the three areas. Literature presented in chapters 5 and 13 and mentioned above in this chapter and below, could be of use, but first and foremost all three professions have their professional work experience as the main source when assessing the qualities and deficiencies of an object/building. The three different professions' methods are also briefly described in chapter 13. What differs between the EEPOCH working model and other models are the arguments for the chosen measures, and the weighing and balancing of these arguments against the consequences of the measures. Formulating the arguments clearly will become an important part of the work.

For the list of cultural and historic measures the use of Axel Unnerbäck's *Kulturhistorisk värdering av bebyggelse* (2002) or Bernard M. Feilden's *Conservation of Historic Buildings* (2003) or other literature can be combined with professional skills.

For the list of energy measures Karin Adalberth and Åsa Wahlström's *Energibesiktning av byggnader* (2008), Enno Abel and Arne Elmroth's *Byggnaden som system* (2008), *Totalmetodiken* by Maripuu et al (2014) or other guides and handbooks from the vast literature on the subject matter may be used, but the main source is professional experience.

For the list of architectural values and qualities Reinar's *DIVE-analysis* (2009), Stenak's *SAVE* method (2011), CABE's *Design Review* (2006), Robertsson's *Fem pelare* (2002) or other literature or methods are used in combination with professional experience from other projects.

All current possible measures are added into separate lists, but a compilation of the three lists of priorities and actions could also be made. The assembled list will utilise experiences for improvement in future work.

Cultural and Historic Values

The measures are adapted to the building and deliver something that enhances its values.

THE BUILDING–envelope, construction, floor plan/layout

1. Foundation, cellar	exterior
	interior
2. Façade, outer walls	exterior
	interior
3. Windows	exterior
	interior

4. Roof, dormers, chimney etc.

5. Entrances	exterior
	interior

6. Inner walls, floor plan

7. Ceiling, ceiling height, floor

8. Fitting-up, equipment, furnishing

9. Kitchen, W.C., wet areas	fittings
	porcelain
	fixtures
	white goods/appliances

10. Attic storey, attic floor

11. Other

THE BUILDING'S OTHER SYSTEMS

12. Dewatering, drainage

13. Heating system

    a. distribution system

    b. control and regulation system

14. Cooling system

    a. distribution system

    b. control and regulation system

15. Ventilation system

    a. distribution system

    b. control and regulation system

16. Water, sewer

17. Electrical system

18. Lighting public areas

    fixed fittings

19. Security, alarm

20. Fire protection

21. Control and regulation system

    a. heating system

    b. distribution system

    c. cooling system

    d. distribution system

    e. ventilation system

    f. distribution system

    g. lighting system

    h. security and alarm system

    i. fire protection system

22. Other

Figure 15.3 shows the list to fill out for Cultural and Historic measures. The ones for Energy Performance and Architectural Quality are designed the same way.

15.5.3 Step 4

Step 4. The fourth step implies that all proposed actions should be abbreviated to fit into the boxes when entered into the separate overview charts showed as table 15.7 and 15.8 below. Many of the boxes will be left empty, though, because it is designed for use by all three professions. The benefit of having all the different boxes in the individual overview charts for measures is not only the fact that it will be easier to compile the charts in the next step; by having them there the person filling out the chart sees the larger context of which his or her own aspect is a part. This may kindle some thoughts already at this stage about how one´s own arguments and proposed measures will affect the others´ proposed actions. If so, the thinking before compiling has already begun. This is then a good start for the upcoming and planned discussion about the compilation and the choices that have to be made in common.

When using the overview charts the left column shows areas and aspects that could be affected by the chosen measures and actions. From a sustainability aspect long-term measures usually are preferable, but not always, to measures that can give results in the short term. The expected results of the suggested measures are placed on a four-graded scale in the three overview charts.

1. High improvement/achievement/enhancement of values, performance, quality
2. Improved, increased values, performance, qualities
3. Diminished, decreased values, performance, qualities
4. Big decline, diminishment of values, performance, qualities

By using a four-graded scale one must consider the outcome of every suggested measure very carefully and try to see the balance or imbalance of the pros and cons. The key word should be long-term management when choosing and deciding on measures. Eventually all current possible measures are added into the overview charts.

The Building | Name of Property | Date xxxx-xx-xx
Cultural and historic values - to preserve, develop | Signature

	foundation, cellar	façades, exterior walls	windows	roof, dormers, chimney etc	entrances	inner walls, floor plan	ceilings, ceiling height, floor	fitting-up, equipment, furnishing	kitchen, W.C., wet areas	attic storey, attic floor	other
measure											
life expectancy											
control and regulation											
impact:											
construction											
material											
details											
paints, colours											
accessibility											
general impression, entirety											
context											
recycling											
sustaiability aspects; environmental, social, economic											
other											
Expected results of measures, and impact on values											

Table 15.7 Overview chart for Cultural and Historic measures 1/2. The charts for Energy Performance and Architectural Qualities have the same design.

The Building's Other Systems — Name of Property — Date xxxx-xx-xx

Cultural and historic values - to preserve, develop — Signature

	dewatering, drainage	heating system (incl.distr.)	cooling system (incl.distr.)	ventilation system (incl.distr.)	water, sewer	electrical system	lighting	security, alarm	fire protection	control and regulation systems	other
measure											
life expectancy											
control and regulation systems											
impact:											
construction											
material											
details											
paints, colours											
accessibility											
general impression, entirety											
context											
recycling											
sustaiability aspects; environmental, social, economic											
other											
Expected results of measures, and impact on values											

Table 15.8 Overview chart for Cultural and Historic measures, 2/2. The charts for Energy Performance and Architectural Qualities have the same design.

15.5.4 Step 5

Step 5. In step 5 the overview charts are compiled into one chart, and if there are colliding interests it will be revealed as well as if there are proposals that can be directly accepted. The charts are showed as table 15.9 to 15.14 below. When working with the compiled charts of measures the respect for others´ professional skills is vitial. Knowledge is altogether relational and, according to Rosengren (2008), localised and produced in and through action. 'The practices that produce and maintain knowledge are inseparable from knowledge itself.' These are basic facts one needs to be aware of when starting the discussion and negotiation. To balance the priorities and actions is the important task in step 5, and the main source for this is the three professions' synthesizing ability. All three act on equal terms. The continuous process needs a creation of trust by transparency, and professionals responding positively to the others´ specialist competence, and understanding how to utilise the added value achieved through collaboration, for coming to an agreement on the balancing of preservation, possible development and energy efficiency actions. This is the core of the planning and design phase.

All proposals will be thoroughly discussed and the professionals´ valuations should be considered from all three perspectives and compared with the owne´s programme and needs. This is a crucial act of synthesizing. There must be good reasons for the proposals. All professions need to formulate arguments for their choices, and these arguments will be weighed by all involved professions, and also be very valuable when communicating with the owner.

There could be some pitfalls to avoid. For example if two possible measures and their arguments appear to lead to negative consequences and are posed against each other in such a way that the only way out seems to be to choose the 'lesser evil', a compelling dilemma has been constructed, according to Perelman (2013), which could be cause for a conflict. This kind of situation was one of the first things discussed in Workshop VII. The situation could occur unintentionally or intentionally, but it should arouse suspicion and the argumentations for the different options must then be processed to get a different starting point.

There is also the question about difference of degree and difference of nature or characteristics when discussing consequences: to what degree can a measure be carried out before its consequences transform the nature or characteristic of an object or building? As understood the consequences must be thoroughly discussed and arguments weighed. Perelman (2013) writes that the pragmatic argument assesses a fact by looking at its consequences, which are often so obvious that they are not discussed, but in this model the consequences are crucial for the balancing of measures leading to the final proposal. Therefore it is important that the consequences are not reduced to mere positive or negative or quantitative results. Furthermore, a chain of causes can be assessed differently depending on if it is seen as a result of cause and effects or as relations of means and ends. The means only have a relative value dependent on the ends' or objective's value, perceived as independent, but sometimes means are transformed into objectives and vice versa. It occurs when something is upgraded or downgraded, for example, if a means is so efficient that it in itself becomes an objective or an objective is considered superfluous and ceases to be decisive. If there are ambiguities, then proposals for deeper investigations should be put forward, or if actual conflicts occur, a skilled mediator could be engaged. Development of a stable framework of weekly routines would be preferable for preventing accumulation of matters in need of discussion. Finally a Gantt chart with a timeline showing the sequences of actions and measures could be helpful for coordinating the proposed actions. It is a simple bar chart with two axes showing actions and their duration in weeks, but it is also a practical operational tool for managing projects and could be used for any stage.

Name of Property

The Building - values, performance, qualities
to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

		foundation, cellar	façades, exterior walls	windows	roof, dormers, chimney etc	entrances	inner walls, floor plan	ceilings, ceiling height, floor	fitting-up, equipment, furnishing	kitchen, W.C., wet areas	attic storey, attic floor	other
measures and life expectancy	Cul:											
	Ene:											
	Arch:											
impact:												
construction	Cul:											
	Ene:											
	Arch:											
material	C:											
	E:											
	A:											
details	C:											
	E:											
	A:											
paints, colours	C:											
	E:											
	A:											

Table 15.9 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building, 1/3.

Name of Property

The Building - values, performance, qualities
to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

accessibility	C:											
	E:											
	A:											
general impression, entirety	C:											
	E:											
	A:											
context	C:											
	E:											
	A:											
recycling	C:											
	E:											
	A:											
sustaiability aspects; environmental, social, economic	C:											
	E:											
	A:											

Table 15.10 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building, 2/3.

Name of Property

The Building - values, performance, qualities
to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

other	C:											
	E:											
	A:											
Expected results of the measures	Cul:											
	Ene:											
	Arch:											
Balanced results												
Decision												

Table 15.11 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building, 3/3.

Name of Property

The Buildings Other Systems - values, performance, qualities to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

		dewatering, drainage	heating system (incl.distr.)	cooling system (incl.distr.)	ventilation system (incl.distr.)	water, sewer	electrical system	lighting	security, alarm	fire protection	control and regulation systems	other
measures and life expectancy	Cul:											
	Ene:											
	Arch:											
control and regulation systems	C:											
	E:											
	A:											
impact:												
construction	Cul:											
	Ene:											
	Arch:											
material	C:											
	E:											
	A:											
details	C:											
	E:											

Table 15.12 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building's other systems, 1/3.

Name of Property

The Buildings Other Systems - values, performance, qualities to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

	A:											
paints, colours	C:											
	E:											
	A:											
accessibility	C:											
	E:											
	A:											
general impression, entirety	C:											
	E:											
	A:											
context	C:											
	E:											
	A:											
recycling	C:											
	E:											
	A:											

Table 15.13 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building's other systems, 2/3.

Name of Property

The Buildings Other Systems - values, performance, qualities
to preserve, develop, improve, adopt, deliver

Date xxxx-xx-xx
Signature

sustaiability aspects; environmental, social, economic	C:											
	E:											
	A:											
other	C:											
	E:											
	A:											
Expected results of the measures	Cul:											
	Ene:											
	Arch:											
Balanced results												
Decision												

Table 15.14 Unified overview chart for suggested Cultural and Historic/Energy/Architecture measures concerning the building's other systems, 3/3.

15.5.5 Step 6 and 7

Step 6. In step 6 when all proposals are processed there should be an agreement on a unified proposal. The measures have been reduced to the ones acceptable or appropriate and suitable for the specific building and the owner's plans for the building. There might have been much reconsideration along the way but this is a part of the possibilities with the designed iterative balancing model. Recommendations for further investigations can be included in the unified proposal presented to the owner/client. When there is a final agreement on all actions and priorities, they are also entered as a short list into the very first protocol.

Step 7. The unified proposal with its results and chosen measures is presented for the owner/client and discussed. This seventh step is a responsibility for all parties and there still may be further investigations to propose before taking any decisions. The owner would also surely hear, and may also want to discuss, all arguments, the balancing and choices made along the way up to the unified proposal. The owner/client may also have suggestions for the continuation.

The owner/client should now have a well worked out proposal to consider and take a decision on or to reconsider according to any recommended further investigations. Next is to decide on the implementation to go to the next phases for detailed planning and construction. If the unified proposal has been adjusted to facilitate a sustainable management there would not be any problem for this decision.

The model described is for managing the first two phases, planning and design. For the owner/client it will result in a proven record of the building and proposed actions which are illuminated and processed from three different perspectives. The management phase will be facilitated with a well-documented building, which implies that it will be easier to follow up.

Before the implementation the chosen measures and actions could be placed in a Gantt chart to show the sequence of actions to avoid measures performed in the wrong order, but also to get a preliminary idea about the time required. If for example, a new heating system will be installed and a new extension of the building is planned it is better to make the extension first to avoid risking too low installed heat effect (kW, MW). A forward-looking view is preferable for enabling a long-term management.

15.6 Comments on the valuations and the processes

15.6.1. Comments on the valuation situation

One difficulty in the valuation situation is that w*hat gets measured gets done*, and any attempt to measure a value also means that the unmeasured values seem less important. What is measured becomes important and the immeasurable is attributed a lower priority, which is also mirrored in the legal framework.

What is needed is a tool or method that allows us to balance all properties and qualities possessed by a building, in a *collective assessment*. One can valuate high quality in a technical sense, but also valuate quality mediated by a story about the unique, individual and special – for example, about the building´s authenticity. The ability to identify high quality is an acquired skill. There are systematical and professional approaches to both the qualities that should be assessed and the assessment itself. Simultaneously, everyone has conscious or unconscious quality criteria by which to value.

There are three main stances to assessment of values: subjectivism, value objectivism and value relativism. These were presented by Svahn-Garreau in Workshop V and also discussed.

There are arguments for all three stances. The individual experience is undeniable at an individual level, but with this kind of subjectivism it becomes pointless to talk about quality or collaboration. Value objectivists mean, for example, that artistic quality is independent of individual experience and instead refer to the classics, tradition and works that have a long durability in a historic perspective. Quality and value are defined and identified by those with special expertise. These specialists are expected to provide critical valuations based on knowledge and experience from the field. Within value objectivism there is not much space either as specialist or expert to decide and make a valuation. Value relativism as a stance has become more current and common within aesthetic issues than subjectivism and objectivism. A universal concept of quality is questioned. A total relativism, however, is also difficult to reconcile with a valuation or an assessment because nothing would matter.

There is also a fourth stance. Everything can be relative in the sense that it is related to people, their beliefs and the common assumptions prevailing within a group of people a doxa. Distinctions between objectivity and relativism are only possible in a human doxa where people are autonomous and responsible for their decisions. Rational choices can be made preceded by negotiation or discussion.

One of the conditions for a fruitful discussion is space for qualified criticism – a criticism that is aware of its starting points and its quality criteria, and which presents them and is able to use them as tools for valuation and assessment. This is context-bound and the discussion demands a meeting where one presents one´s view. Consensus is not a prerequisite for a fruitful discussion, but different perspectives that come together in a dialogue are. All four relational aspects mentioned in the analysis above in chapter 11 – communication, understanding, equality and transparency – are important parts of an open and equal discussion.

There must be space for dialogue. Despite the different starting points and perspectives of the three professions, they still have much in common and a discussion about the properties, qualities and values is possible.

15.6.2 The valuation process

In a valuation process there will be some delicate moments when one´s own knowledge will be examined, and when one has to think everything through really carefully. Finding and formulating the right arguments for chosen actions is one of them. It is also when to classify the proposed measures in the four-graded scale, and come to a conclusion and common decision. One has to value each object's and each situation's distinctive qualities.

In the end, after completion of the measures, any mistakes and errors are amended an incorrect mechanical system, for example, that is corrected increases the building´s total value. An incorrect installation or replacement of materials that resulted in a loss of cultural value cannot be corrected, however. The value is gone. The patina of a material or the authenticity of a construction cannot be recreated and the building´s total value decreases. It is in its nature. The issue about how technical installations are effected by demands for preservation is as important as the issue about how cultural values are affected by the installations, and sometimes priorities during the process are necessary.

Creating dynamics is necessary not only for the process to work as a whole, but also within the teams and between the individuals. The working model is built on common work on equal terms to run a process. This demands an open process where dialogue may take time and where time is given for insights to appear. The model is based on the professionals' knowledge and experience, but also aims to deepen that knowledge. One has to have knowledge to see a certain value, to be a specialist; but

for valuation one needs good judgement, to be judicious, and for that mere information is not enough. Judgement builds on knowledge *and* experience. Experience is information and awareness that have to be processed in discussion with other people to become knowledge which in turn has to be considered critically, or be processed by critical thinking, to understand if anything could be different than it seems to be. Knowledge as a creative process is often lengthy and if it should lead to innovative results it cannot be predicted or made into routine (Liedman 2001), but it can be placed in a firm framework that allows great freedom for new knowledge production. The framework establishes a space in which the different experiences can be consolidated, processed into knowledge and jointly examined.

Project management usually involves managing measurable requirements using checklists in coordinating and controlling a project from concept to results. It is about documenting *what*. The documents produced in the EEPOCH project for the working model, however, have been designed for a process – not as checklists – for possibilities of *how* to work or perform.

Using the working model creates space for action and flexibility to be able to bring new facts to light, thus leading to more informed decisions which can be made as close as possible to the implementation. One has to look at it and manage it as a process, not as isolated events. Continuous discussion with the owner/client and commitment on his or her part, are essential elements in this process (Fristedt & Ryd 2004). The iterative process, allowing reflection and new decisions to be taken along the way, provides better adapted decisions. This kind of process is especially important in an industry that traditionally has been considered rigid and conservative as reported in the governmental report *SOU 2002:115 Skärpning gubbar* and in a report from Boverket (2009) *Skärpning på gång i byggsektorn*. Deficiencies and and conservative attitudes in the construction sector in general are described and stated in both reports. Times and circumstances have changed, however, and an awareness of the need for innovation also appears, together with solutions, in the latter report. According to the author these solutions require change and sharpening of routines and business culture within the professions and construction sector. Quality is the key word.

15.7 A top-down inventory

One practical use of the initial protocol created for the working model is to make an overall study of a larger number of the objects restored within the Halland Model. The protocol is used for an on-going top-down inventory to supplement the initial bottom-up inventory and assessment of only a few objects performed and accounted for in the licentiate thesis in Phase 1.

When using the protocol on objects heated to +18°C or more on an annual basis, it is possible to discern a common pattern from general data such as At_{emp} and its relation to kWh/year, type of measures and preserved cultural and historic values, and the generalisation is used for a comparison between the objects. The hypothesis is that patterns discerned in Phase 1 also show in the top-down inventory which this far in the project has been confirmed.

The work will be described and analysed in a separate report in Swedish, which could be used in Halland by the professionals engaged in the energy and Heritage sectors. Only one example of the objects has been translated into English, showed in table 15.15 below, to show how the actual result look and it is presented below. This can be regarded as a follow-up of the work initiated in Phase 1 and at the same time as the very beginning of the actual use of the working model. The object is one of the buildings at Spenshult Hospital, which was built in 1911 and designed by Ivar Tengbom. It is situated in Oskarström in the municipality of Halmstad.

Follow up of the Halland Model 2013-14

Contact: Carl-Gustaf Pettersson_035-263 52 20 mobile 070-663 52 20_____ Date_2013-10-23_
carl-gustaf.pettersson@spenshult.se

BASIC FACTS	
Object	A – *Överläkarbostaden* (chief physician´s residence)n
Name of property (and number)	Spenshult 1:8 A
Municipality	Slättåkra socken, Halmstad
Owner	Axess Medica Spenshult 101, 313 92 Oskarström
Year of construction	1911
Year of restoration	1999, reports 2000:24 and 2000:23
Use / function	Rehabilitation at Spenshult's hospital
Construction and façade material	Solid wood 3" (inch) with 1" boarding on both sides, wood-paneled façade with yellow linseed oil paint
Insulation, type/placement and location	–
Windows, type, 1-,2-,3-panes, coating	2-pane, original window with mullions in the outer sash, 6, 8 or 9 lights per sash depending on the size of the window. Maintained with putty and linseed oil paint
ENERGY PERFORMANCE	
Energy use, heat and hot tap water	82 778 kWh per year (corrected value 102 885 kWh)
Heat source	Natural gas since 1992, condensing boiler installed in 2011.
Distribution	Hydronic radiators. +20-22°C indoors. Outdoor sensor controls the flow temperature, app. +45°C at outdoor temp. 0°C but the curves will be adjusted.
Electricity use	Total amount is unknown.
– **whereof for household/occupational (business)**	–
– **whereof for running of the building**	According to the energy declaration it is 8 335 kWh per year
Ventilation/type, quantity i.e. air flow/air exchange **OVK (ventilation control)**	Natural ventilation Ventilation control carried out with air flow showing an exchange of air volume of more than 0.5 per hour.

Cooling	–
Local fireplace	There is an open fireplace but it is not approved for firing.
A_{temp}, m^2	424 m^2
kWh/m^2per year	255 kWh/m^2per year of which 20 kWh/m^2per year is electricity for running. This has been calculated from a corrected value for heating, hot water and electricity, in total 108 069 kWh per year (Energi-Index).
Reference value, BOVERKET	Energy requirement 90 kWh/m^2per year BBR 2012, BFS 2011:6 Statistic interval for buildings in the same category is 175-213 kWh/m^2per year
Energy declaration	Yes. Performed by Linda Wisell, Siemens AB 2009-10-27
COMPLETED MEASURES	
Building; construction, material	The building was restored, more or less to its original condition in both appearance and in choice of materials in 1999.
System: heating, ventilation	The whole electrical system was reconstructed, and water and sewer systems were exchanged. The natural ventilation was supplemented by installation of exhaust air vents in *every room*, and they had to install extra ventilation ducts from some of the rooms to fulfil this.
Other/comments	When the gas boiler from 1992 was exchanged for a new condensing boiler in 2011, the energy use decreased by 14-15 % annually. A few years ago the inner walls were redecorated when the function of the building was changed from being for conferences and meetings to rehabilitation. The kitchen was also transformed.
CULTURAL AND HISTORIC VALUES	
Conservator	Björn Ahnlund
Preservation classification 1, 2, M	Class 1, described in the municipality plan for conservation. Spenshult *Överläkarbostad*
New inventory, 2010, classification A, B, C	Class A; Visited and assessed 2006-05-18 by Björn Ahnlund; http://webbgis.lst.se/beb_inv/Hsd/Slättåkra/890.jpg http://webbgis.lst.se/beb_inv/Hsd/Slättåkra/890a.jpg Functional-ID 1, residential
Document value, historic properties: Building history; original material/patina, construction/building technology, design/architecture, technical-,	Architectural, and Societal and Socially historically valuable Wood-framed building with moulded wood sidings and pitched roof with tiles; 1.5 storeys; origin ca. 1850-1920; Good condition;

societal-, social-, and personage-history values.	
Experience value, aesthetic and socially engaging properties: Architectural/artistic, patina, environmental, identity, continuity, tradition, symbolic values.	Architectural; Continuity value;
Overall/reinforcing motive: Authenticity, quality, legibility/pedagogic value.	Authenticity, genuineness; Pedagogical value, legibility; Not of national interest. Not valued as a historical monument today, but could be considering the high value and the A classification.
Other/comments	
Function, residential/ work environment, real and perceived/experienced	The building works well for its purpose and has a good indoor climate. In the interior there are more modern decorated walls and surfaces.
Environment, figuration, 'gestalt'	Choice of material and design distinguishes from the main building and clearly shows that this is a private residence. Hierarchy and spheres are thus clearly separated. Today's use and rational maintenance is probably the reason for the simply kept garden. The whole area and its environment have great architectural values, situated or nestled into the woods. Several of the buildings in the area have great architectural values.
Architecture, design	The building's proportions are good and the materials are solid. The design of the detailing is of great character and professionally crafted. The gestalt is friendly. An excellent example of a private residence for the well-to-do of the day.
Other/comments	The main building in the area is of solid stone with rendered façades and is designed by Ivar Tengbom (1878-1968). Tengbom was a well-known, award-winning and reputable architect who designed churches, hospitals, schools and universities, banks and private palaces, and he also had conservation assignments. The Stockholm Concert Hall 1924-26 is probably Tengbom's best-known building and, together with Asplund's Stockholm Public Library, the most widely recognized example of neo-classical architecture of the Swedish 1920s, in English referred to as Swedish Grace. Tengbom was appointed architect in the Office of the Chief Intendant in 1906 and a professor at Royal Institute of Art 1915–20. Tengbom Architects was founded in 1906 and is today one of the world's oldest architectural office, and one of the leaders in the Nordic region. The Spenshult hospital area was constructed between 1911 and 1913. Some buildings were added during the 1940s and 1950s. Within the area some large parking areas have been added that were not planned from the beginning, but they nicely made and set slightly apart and surrounded by the woods, so as not to destroy the area's character.

MOISTURE PERFORMANCE	
IR camera	
Calculation	
BALANCE	
Cultural environment – choice of level of ambition for protection/preservation	
Energy – choice of level of ambition for action/intervention	
NEW MEASURES	
Cultural environment – possible preservation and measures	
Energy – possible intervention and measures	

Table 15.15 shows the actual use of the protocol designed for the working model applied at Spenshult 1:8 A, situated in Oskarström.

OTHER

The area as a whole has a central for district heating with condensing boilers. There is a culvert large enough for inspection, for the distribution. When the boilers where replaced in 2004 most of the pipes were replaced and are now better insulated. HN

PHOTO


15.1

Photo 15.1 The photo from the inventory 2006-05-18 by Björn Ahnlund shows the garden side.

PHOTOS

Spenshult 1:8 A, *Överläkarbostaden* (Chief physician´s Residence), H. Norrström 2013-10-23

15.2

Photo 15.2 Spenshult_1-8_A3

15.3

Photo 15.3 Spenshult_1-8_A1

15.4

Photo 15.4 Spenshult_1-8_A2

15.5

Photo 15.5 Spenshult_1-8_A4

16 The working methods for collaborative management

The working model for balancing values and properties will do no better that the quality of methods, discussions and arguments by which it is processed. The chapter describes methods and stances used for supporting the collaboration needed when using the designed model. Collaboration is a socio-cultural activity which must start early in a process to work throughout. A set of working methods and concepts are presented to illustrate a framework. The analyses of earlier conclusions drawn from the Halland Model, the four mediating relational aspects, and decisive outcomes from the workshops have guided this design. For the initial collaborative work hermeneutics is presented for use in interpretation and *understanding* followed by doxology and rhetoric for arguments, which are needed for the *transparency* aspect. Communicative rationality is used for discussion and ethics, and finally some methods used within organisational systemic thinking are presented. The two latter methods address *communication* and *equality*, but all four relational aspects are inherent components in the four working methods i.e. they are different but have this certain relationship.

We see the world from different perspectives and have different notions of what constitutes fairness. Furthermore, different sides may well use the same word or concept to evaluate and characterise beliefs and ideas, yet load them with different notions and values. Therefore the practical uses are also described. Theory and practice together form a framework of methods for the collaborative work but the practical use described will work even without embracing the social and philosophical stances.

As all the different professions with their special skills are important for the performance of the working model, and need to act freely without constraints it would be unwise to try to design one strict method for all to observe, or comply with. That would fail to take advantage of their creative ability, their synthesizing ability, and their special expertises. The working methods are based on confidence for the professions and relying on them to cope with the situations that arise without a direct leadership, to manage conducting a direct-democracy. In trusting the professions' ability for collaboration, new working methods can be developed.

16.1 Stances

Our individual being and social interaction cannot be separated from each other. They are intertwined parts of a whole, but one can describe their relation. Individual reasoning is a processing part of the valuation situation. The individual reasoning as described and used for an outline of these methods has a philosophical stance shown to the left in the figure 16.1 below. Social interaction is a processing part of the collaboration. The social interaction as described and used in turn has its stance in social science shown to the right in the figure16.1 below. These are the conceptual views in brief of the suggested methods for making the designed model work. The philosophical stance is chosen to emphasise an open mind and awareness of one's responsibilities, and provides a practical method for arguments used in discussion. The stance in social science is chosen because collaboration is a socio-cultural activity that needs a firm framework to be efficient, but does not interfer with the autonomy of the individual.

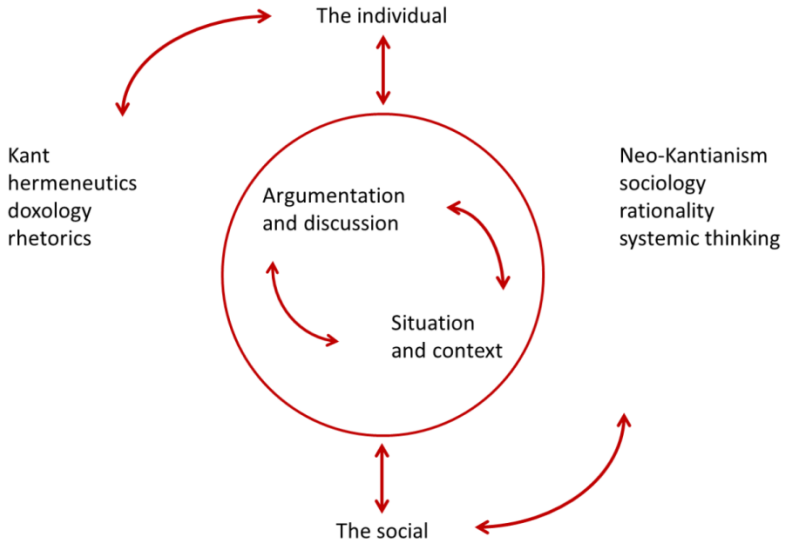


Figure 16.1 The conceptual views of philosophy and social science working as the basis for the suggested methods for making the designed balancing model work, and their relation to the individual and the social parts.

To account for proposals the participants need methods to formulate arguments for their motives and for the expected impact of the actions. Formulating these arguments will be a help for understanding, both for the one who proposes an action and the ones that will discuss it, and this is part of a strategy of transparency. The proposed measures, their causes, motives and their arguments are the basis for the balancing act implicit in the model, where all advantages and disadvantages will be weighed and discussed to come to a unified proposal with a list of actions for energy efficiency, preservation and architectural design.

Professional work is mainly about limits or boundaries to make all existence manageable and to communicate the work. For this work tools are needed and philosophy is one of them. Interpretation for understanding is used by all professions in various situations and hermeneutics is thus a familiar method that can be used for learning about one another's skills as part of creating a good working climate. According to Sven-Olov Wallenstein lecturing 30 January 2013 at Chalmers, architecture is man's relation to the world and man is the measure of everything. Furthermore, philosophy must be the foundation for psychology, phenomenology or any other structure of consciousness. Philosophy is thinking as practice structuring reality, and hence the use of doxology and rhetoric for the suggested working methods in this thesis.

There is no method without a theory and theory precedes (is proleptic of) the design of a method. This implies that method is never without presuppositions. Furthermore, according to Mendieta (2012), the rhetorical enactment of all communication is the ground on which method and theory integrate. Rhetoric is both a practice and a theory. Doxology is a practice of knowing, using, creating, changing concepts. The sophistic part of doxa is that we measure our world by *logos*, and the rationality in rhetoric is the part concerning argument, which is needed to be able to discuss, to take part in a discussion.

Theory does not a take stance but criticality does, according to David Leatherbarrow in a 23 January 2013 lecture at Chalmers. This statement led to a closer look at Habermas who is one of the main representatives of critical theory, or the Frankfurt school as it is also named. He builds on both Weber´s sociology and Marxist theory and has an interest in hermeneutics. Habermas asserts that

man is not only characterised by her societal position but also her individual history, and he has also combined philosophy with psychology. This is expressed by a pair of concepts, the system and the life-world, which both have their rationality. He sees the life-world with the communicative rationality as a foundation for democracy, which must be reconciled with the societal system's rationality (Liedman 1998).

Systems thinking is necessary to manage the physical world and systemic thinking for the social. A mix of both is prevalent to different degrees in all thinking and action, be it at individual or societal levels. This is practically driven and context dependent. Both are equally necessary. Some methods used within systemic thinking conclude the chapter.

16.2 Interpretation and understanding

Interpretation and understanding are important parts in the professions' working methods and also a way of learning and for widening one´s horizon. A short text on hermeneutics (Jeanrond 2003; Gadamer 1997) is presented to illustrate that it is connected to knowledge production, which is a constantly on-going activity. Interpretation is needed for the assessment of values and measures, and also for the understanding and respect for the professions' skills.

16.2.1 The hermeneutic circle

Understanding linked to hermeneutic tradition and explaining linked to the natural sciences are sometimes still seen as opposites, but as stated earlier, todays' professionals and researchers use both within their different fields. All investigations and research methods are human constructions. An important notion is the hermeneutic circle, which Schleiermacher described (Jeanrond 2003) and Gadamer (1997) developed. This could be used by the professions working with the model for a first orientation in each other's experience, skills and conditions for working with and interpretation of built cultural heritage. Gadamer describes the process of the hermeneutic circle as a movement between an internal reflecting and external tentative dialogue in the individual horizon of understanding. This metaphor is deceptive, though, since the circle ends where it begins, and a hermeneutic spiral implying a movement forward in any direction would be a more appropriate metaphor to show that the understanding constantly develops.

16.2.2 Context and history

Jeanrond (2003) has made a clarifying summary of the history of hermeneutics, which he calls making a sketch. According to Jeanrond we are always already standing in an intellectual tradition's cultural interpretational context and in a socio-political and gender-determined context. Our access to individual texts as well as to reality is thus always already to some extent prescribed to us. The process of understanding is always contextually predetermined. This cannot be changed. Still, we can discuss how we could relate to our preconceptions and pre-understandings. We can choose to fully conform to our interpretations of a text or a reality in our pre-understandings, or we can use them productively in a process of interpretation where our horizon of understanding can be altered.

In the early 19th century Schleiermacher, in accordance with the enlightenment, presented the hermeneutical thought unit. Every text should be respected for its individual meaning, a psychological interpretation, as well as a grammatical interpretation. Understanding is hence not only the result of a technical interpretation procedure, today we would call it instrumental reason, but must be evaluated as an art consisting of a subjective part as well. Thus hermeneutics became an independent philosophical discipline, and Jeanrond suggests that it is striking how far ahead of his time Schleiermacher was.

For Wilhelm Dilthey the act of understanding was about life and its various forms of expression and thereby about understanding human nature. In the process of understanding we use our ability of finding analogies. Since each interpreter is located in a specific historic and social context this ability implies that every interpreter will understand a given object in his own way. Here we have the beginning of pluralism in hermeneutics.

Gadamer's interest lies in the philosophical work and the appearance of reality, and not one or the other method. The aim for him is conflation of horizons, and his hermeneutics has a character of a practical philosophy Gadamer emphasizes the importance of interlocution and his hermeneutics has received both agreements as well as critique, but has despite objections prevailed as the most important point of departure for the further discourse of hermeneutics.

In Paul Ricœur's hermeneutics the two notions explain and understand are not opposites, but necessary allies towards a responsible assessment. Hermeneutics as practice-oriented scientific effort, and hermeneutics as interpretation of the human horizon of meaning, are related in their essence. Through the dialectic between understanding and explaining it is possible to pass on Schleiermacher's work with comprehension of the text. Ricœur has his departure in that what is studied is an independent work, object (e.g. a building) or story (e.g. a professional approach) released from its original conditions, and which is capable of changing its receiver´s view of the world.

16.2.3 Open to change

Hermeneutics must be pluralistically constituted so that the understanding subject remains open to the other, and thus open to change. The ultimate aim of interpretation is trying to approach the foreign. It is about resisting shortcuts and constantly returning to the tension between the unknown and the familiar in that which is to be interpreted.

Contextuality is needed when universality has proven to be insufficient, but dialectics between them is necessary. Hermeneutics can be perceived as a link between contextuality, particularity and the specific on the one hand, and universality and the general on the other – in other words, between systemic thinking and systems thinking, referring to Hornstrup et al (2012).

There is an undeniable requirement, according to Jeanrond (2003), of listening more attentively to other people´s experiences, without which neither a responsible understanding nor a view of human self-understanding would be possible. There must be a critical and self-critical interpretation of the contemporary horizon of understanding.

'Interpretation seems like a minor issue, but it is not. Every time we act, make a judgement, value, understand or even experience we interpret. To even understand is to interpret.' (Jeanrond 2003) An open dialogues carried by the human ability to form analogies, is not about transforming otherness and difference into identity and similarity, it is to allow for the other and the different to become the possible. Translated into or analogous with the working model, this is about the dialogue among the professions to understand and respect the other´s significance, their different roles in the process and how to make the best use of each skill.

16.2.4 Practical use

Today hermeneutics can be used when exploring persons, actions or products of any kind, theories, sculptures or texts, disciplines, institutions or laws when we want to understand them and their intentions and expressions (Føllesdal et al 2009). Working with a building, all professions make different interpretations of it. Most of the work is evident for those of the same profession, but in collaboration with other professions these evident methods and steps should be explored and

explained. In the dialogue a wider and deeper comprehension of the specific building's potential will evolve for all involved professions – both for the one explaining and for the ones exploring and trying to understand.

Gadamer's hermeneutical interlocution as a model is a possibility for a community of interpretation, a kind of intercultural hermeneutics. It does not lead to a smoothing of differences, but rather to an understanding of the differences and hopefully a mutual respect. Every dialogue with the other, however, presents a risk for conflict. Nevertheless, this is in itself no argument against the possibility of a sincere conversation between representatives of different horizons of experience and professions.

Open-mindedness and critical thinking in the discussions among the three professions would reveal the multiple discourses operating in their profession's culture or doxa. For this to happen, clarifying notions and concepts are needed and have to be worked out. Every team member's experience, special skills and role should be explored and investigated in discussions where that which one wants to understand is not perceived as something that does not concern oneself, but as a possible source for learning and insight. Everyone will have to formulate the various strategies within their different professions to map the complexity and enhance the understanding of each other´s profession for guidance on how the collaboration can be carried out. The discussions should be seen as a first introduction and the expected outcomes as a mapping of: their professional special skills and experiences and roles; methods and strategies i.e. how they interpret a building and identify problems and possibilities which is the basis for their design of measures. The aim is to find the similarities and dissimilarities among the professions.

Understanding is an important part of a strategy of transparency. It can take a meeting or two for mapping but it will be time well spent, which in turn saves a lot of time in the further process. This should be the first assignment for a new team to avoid misunderstandings and prevent conflicts. If those who are forming a team already know each other's skills well, one short session may be sufficient. The idea for a method of this kind was developed during Workshop V.

16.3 Formulating arguments

Understanding of the professions' different *thought style* (Fleck 1979) or *doxa* (Rosengren 2003; 2006; 2008) is the next step for creating a good and transparent working environment for collaboration. It is also about trusting the professions´ability to reflect and formulate arguments for their choices of measures. This is the core of the weighing within the designed working model. The most appealing, and surprising, result from analysing the management and collaboration within the Halland Model was that on one occasion a discussion that was on the way to becoming to conflict, and pushing the different interests made it possible to make progress, resulting in the best balanced example (Norrström 2011). Thus a first idea of discussions with arguments supporting the model of weighing and balancing emerged, and eventually led to rhetoric (Perelman 2013) where good arguments also need an ethical perspective.

All the different professionals engaged within the heritage sector have their specific knowledge shaped by practice and their profession's disciplinary matrix, which could cause difficulties in the valuation situation when measures and their consequences are to be discussed. Therefore a view of what a disciplinary matrix consists of is appropriate. The epistemologies traditionally connected to different disciplines could also constitute difficulties in the valuation situation, but there is an alternative view on this issue.

Habermas (1997) states that the process of cultivation and education takes place in a context of tradition shared with other people: individual identity is also marked by collective identities, and a

private life story is part of an overall historic context. The philosopher and rhetorician Rosengren (2008) calls these different environments that shape our identities *doxai*. The definition of a *doxa* is that which one can hold to be true, – the prevailing beliefs and customs, practices and traditions within a major or minor group of people. He also uses the Greek notion *logos*, which in Greek (Lübcke, ed. 1988) means relation, explanation, evidence, speech, story, reason, thought, concept, assertion, word or universal world order. The definition of the Greek *doxa*, (ibid.) is opinion, conjecture, expectancy, supposition, belief. *Doxa* is in Greek philosophy seen as opposite to knowledge and insight, *episteme* in Greek (ibid.). The so-called accumulated knowledge which through time has proven its truth is usually categorised as *episteme*, and exemplified by such as the Pythagorean Theorem or algebra; accumulated knowledge, however, is not congruent with systems thought which is crucial to the very idea of science described earlier in 12.1.2. Episteme is still valid for many natural sciences, working with the measurable, quantifiable, and predictable. In formulating a *doxology*, Rosengren has studied similar but different concepts by Ludwik Fleck and Chaïm Perelman among others.

16.3.1 Fleck's thought style

Ludwik Fleck was a predecessor to Kuhn and wrote his book on scientific development in German in 1935. Fleck (1979) formulated the nucleus of knowledge production that has dominated the latter part of the 20th century. Rosengren (2008) summarises Fleck's thoughts involving three factors: the individual who seeks knowledge; the social, historic and discursive epistemic situation that form the individual´s topical knowledge; and that which is in focus, the object of knowledge. This is reminiscent of the three parts in hermeneutics described above. Fleck not only emphasises logos but also experience by training of the physical and psychological skills that enhance individual knowledge ability. Fleck developed four conceptual tools. Sady (2012) made a clear summary of Fleck's concepts, writing that he was claiming cognition to be a collective activity, possible only on the basis of a body of knowledge acquired from other people.

A community of persons mutually exchanging ideas or maintaining intellectual interaction is defined as *a thought collective* (Fleck 1979). The members not only adopt certain ways of perceiving and thinking, but also continually transform it. This transformation occurs in their interpersonal space: 'It is easy to observe this phenomenon in everyday life. When a group of people speak about something important, they start to speak about things which would not cross their minds if they were alone and which they would not tell if they were in another group of people. There arises *a thought style* characteristic for that group' (Sady 2012).

What Fleck (1979) calls a thought collective is bonded by a specific mood, and arises when people begin to exchange ideas. Through understandings and misunderstandings a peculiar thought style is created and 'consists of the *active elements*, which shape ways in which members of the collective see and think about the world, and of the *passive elements*, the sum of which is perceived as an "objective reality". What we call "facts", are social constructs: only what is true to culture is true to nature. Thought styles are often incommensurable*:* what is a fact to the members of a thought collective A sometimes does not exist to the members of a thought collective B' (Sady 2012)

Rosengren (2008) comments that Fleck's thought style seems to be local, consisting of a casual conversation of two people to more stable organisations contrary to Michel Foucault´s 'epistem' or Thomas Kuhn´s 'paradigm' which both try to capture an epoch or a whole discipline's dominant way of thinking, and making arguments.

16.3.2 Rosengren's practical doxa

Doxology is an alternative way of looking at knowledge described by Rosengren (2008). His departure is Schiappa´s (2003) interpretation of Protagoras´ human-measure fragment that *'of all things the measure is man, of the things that are, that they are; and of things that are not, that they are not'*. In his doxologic essays Rosengren (2006) assumes that Protagoras really meant humans in general when using the Greek word *anthrōpos*, and not a single human being. Taking this literally that 'man is measure of everything' has implications for what we traditionally call truth, knowledge and knowing, meaning that our construction of knowledge is valid only within the limits of our human measuring, and hence has an unsettled foundation due to human conditions and failures. It is a way of asking what it means that our knowledge is human, and that we must understand the conditions for objective knowledge as well as for relativistic scepticism. A doxological way of looking at our knowledge is to perceive it and describe it as multi-layered and sometimes contradictory as of how it actually is (Rosengren 2008). Thus, doxology is an attempt, to readdress and reconsider what knowledge, science and objectivity could be (Rosengren 2006).

If everything is measured by human measure, all facts, truths and knowledge must be understood as human, related to and dependent on our human being-in-the-world and our different doxai, and measured by logos that help us to distinguish the unreliable from the serious statements, falsehood from truth, and guarantees our humanity (Rosengren 2006; 2008). It is an important tool for forming our nature and ourselves, it is something we are born into, trained in and shaped by, and that we ourselves transform. Humans are always situated in a user context of which logos is an essential part. As being an indissoluble union of speaking, thinking, argumenting and acting, it becomes the most important human tool and mediator between the individual and humanity.

All our human endeavours are measured by human scale and ruler. By accepting that knowledge and truth are diverse, changing and uncertain we can learn something new. Distinctions between objectivity and relativism, true and false etc. are possible only in human doxai. They are not prior to or independent of our human endeavours for knowledge. This knowledge creation is not free and unconditional yet not deterministic, predetermined or reducible (Rosengren 2006). Human knowledge can be good or evil, creating masterful achievements and monstrous ones, and this is why ethics is necessary in both the individual and the political community. Ethics and the possibility of combining it with free will are described in Kant's categorical imperative (2002) on maxims. Individual maxims are distinguished from the objective principle, the practical law. Maxims constitute the interface between ethics and morals since they can be judged from both ethical and moral aspects. Rosengren suggests rhetoric as a tool for using Perelman's idea of the universal auditorium as judge.

16.3.3 Perelman's new rhetoric

In his book *Retorikens imperium* (2013), Perelman presents a practical, rhetorical philosophy with different kinds of argumentation and the idea of the universal auditorium, which is always there judging the rhetor whether present in reality or only in the rhetor´s mind. Perelman argues that those who believe in the existence of rational choices, which are preceded by negotiations or discussions where different solutions are confronted, cannot manage without a theory of argumentation based on the new rhetoric. The Greek *rhetoric* (Lübcke, ed. 1988) originates from *rhetorike (techne)*, from *rhetor*, speaker, and means oratory, the art of speaking well. Within the rhetoric tradition, rhetoric as an art of communication is the formulation of knowledge, but is also a theory about knowledge. An experience becomes an experience first when spoken of. All understanding is related to the human. It

should be conveyed and directed to someone, and mediated to enable action. The objective in rhetoric tradition is the junction of understanding and action, knowledge and feelings.

In Perelman's (2013) new rhetoric and the concept of the universal audience/auditorium, the speaker is transformed into anyone who writes or speaks with the aim to convince or to persuade contrary to the three Aristotelian situations of which Perelman has made a thorough study. By this transformation the constantly present audience is also transformed into an auditorium that the speaker or writer often only imagines, but from which he or she nevertheless must seek approval from. The text or speech itself is replaced from its traditional demonstrative, legal or political context into any language. The need for an auditorium's approval prevents sophisms. The truth, evidence, or knowledge cannot exist outside or beyond its human context. Thus rhetoric is the foundation for all other knowledge, scientific as well as philosophical, through good arguments.

In one sense, one can call Perelman´s concept polar - seen from the speaker's position, one has to prepare the arguments such that one believes they can convince any reasonable person, while as part of an audience one has to judge whether the arguments read or heard may convince all knowledgeable and wise people. The point of talking about a universal audience is in part to emphasize that our views are historically and socially situated but primarily it is to preserve the rhetorical insight that there may be two diametrically opposite ways of perceiving the same thing without any one of them being false. Perelman's objective is to ensure the possibility of a multitude of different ways to be reasonable. For all things there are always two opposite logoi – but no single, unique and autocratic or omnipotent truth - a statement that applies both to Perelman´s and to Protagoras´ philosophies.

Perelman (2013) writes that if one takes away the divine warranty for evidence then all thinking becomes human and fallible. A modern view which Popper 1959 defended is the thought that every scientific theory is just a hypothesis which necessarily transgresses borders of experience, and which is neither evident nor fallible. In the absence of compelling evidence, for a hypothesis to be accepted it must be supported by good reasons that are recognised as good by other members of the scientific community. The status of knowledge ceases to be impersonal, and every scientific thought becomes a human thought – fallible, situated and subject to controversy. Every new idea must be supported by arguments retrieved from the methodology of one´s own discipline and evaluated according to it.

16.3.4 Episteme and doxa, and their uses

Rosengren (2008) shows with various examples how episteme is not sufficient to describe human knowledge. Knowledge is always situated in time and space, involves people, and cannot be separated from culture and society. Doxa is a broader concept of knowledge comprising also sensitivity, open-mindedness, and logical clarity – sense of what is important, interesting and meaningful in a certain context. It must also be determined and situated historically as well as socially by focusing on practices and those who carry and pass on these practices. Rosengren has found the basis for this broader concept in rhetoric where the concept doxa defines what people hold to be true, believe and act from – what people in the addressed group consider knowledge that has withstood debate and argument.

Epistemic knowledge tries to give a view of reality as it is, independent of humans, while doxic knowledge gives a view of the world as it appears to us *as* humans. The reality that doxic knowledge concerns and relates to is constantly changing, is not uniform and it is a human product. During a lifetime one will be part of many doxai and there is a constant impacting interaction between them, as they complement and transform each other. A rhetoric-doxologic view takes this into account and provides a more individual-oriented agent-perspective that is not present in Fleck´s epistemology; but

they are not contrary, rather overlapping each other using different tools. Rosengren uses argument-focused Aristotelian rhetoric where *ethos* and *pathos* alongside the main *logos*-argument enable one to see the relations between an agent's actions, and the actual situation as well as the dominating doxa. Rhetoric becomes a tool for action providing a possibility to see, process, transform and recreate essential parts of our knowledge. This is the reason why doxa seems preferable to the normative thought style, and could enable an open and transparent discussion in the use and practice of the working model. Comparing the descriptions of doxology and systemic thinking the latter makes use of doxic knowledge.

The only possible measuring for rhetoric is its actual efficiency, both as a doctrine and as a practice. The participants using the designed model have to formulate arguments for their choices and proposed actions. Describing that which is familiar and self-evident within one´s own profession for other professions could be challenging and knowledge of how to build up a good argument could thus be helpful.

16.4 Discussion and negotiation

Key words in the earlier results from the management and collaboration are transparency, horizontal organization, and a good and inclusive working climate where new ideas are encouraged and promoted, allowing for autonomy. In making this happen the participants' consent to share responsibilities is called for. Habermas´ *communicative rationality* (1997) is a method by which it can be achieved. The following is a presentation of Habermas´ communicative rationality and the five processual requirements of discourse ethics, which are congruent with the horizontal/democratic organisation, transparency, autonomy etc. found in the description of management and cooperation within the Halland Model.

16.4.1 Communicative rationality

In the tradition of critical theory, or rather a critical reflection, Habermas (1997) has developed a *concept of rational collective will formation*. It is based on communicative rationality and communicative reason, and the belief that it has a normative content to make use of and to depend upon. It is not a norm for action but instead a procedure to test validity of norms and normative judgements/opinions. The procedure is the argumentation within a pragmatic and practical discourse. The question for Habermas is whether a practical discourse can be institutionalised in the legal system and in the political system. That part which belongs to rational systems thinking on a higher level is not of primary interest for the reasoning in this thesis, however, since this thesis is limited to forms of collaboration, to groups´ and teams´ work procedures and forms for assessments and balancing, choices and decisions. Instead the interesting part is Habermas´ communicative action in which actors can be coordinated on the basis of consensual norms, but the suggested possible strategies could also be useful. They will be used for an analogy in the following. Habermas´ thinking is rather idealistic because it is usually not possible to prediction how people will react to a certain action. Achieving consensus is god, but ultimately one can only truly influence one´s own individual actions, which will in turn have an effect on the whole. Nevertheless, using them in a pragmatic way, Habermas´ schematic strategies and practical discourse could, in an analogy, provide the firm framework for the working model in which human action can take place.

Habermas´ base is the theory of communicative rationality where the notion of validity is connected to the idealised assumption of an argumentative or discursive agreement. In this discursive agreement or principle he distinguishes moral principles, which refer to norms of action for universal validity and democracy principle, which refers to norms of action for legal form. The latter express an idealised condition for democratic procedures that is, the result should be based on the best available

arguments and thus be worthy of respect (1997). That is good and worth reflection, but in this thesis the respect is also supposed to be based on the three different professions' skills and experiences in their respective areas of excellence which will be guiding the practical discourse.

16.4.2 Criteria

For a practical discourse to be performed there are, according to Habermas, some criteria which he calls discourse ethics. Flyvbjerg (2013) has studied Habermas´ (1990; 1993) concept for democracy and his writing on discourse ethics. He has also made a useful summary of the five key processual requirements for Habermas´ discourse ethics as follows:

> (1) no party affected by what is being discussed should be excluded from the discourse (the requirement of generality);
>
> (2) all participants should have equal possibility to present and criticise validity claims in the process of discourse (autonomy);
>
> (3) participants must be willing and able to empathize with each other's validity claims (ideal role taking);
>
> (4) existing power differences between participants must be neutralized such that these differences have no effect on the creation of consensus (power neutrality); and
>
> (5) participants must openly explain their goals and intensions and in this connection desist from strategic action (transparency).

The requirements are all congruent and analoguse with the outcome of the analysis of teamwork performed in the Halland Model.

Habermas´ (1997) discourse theory implies different types of discourses as well as compromise targeted negotiations for conflicting interests that cannot be regulated on a consensus basis. Rules are also needed for fair balancing of interests. We all make reasonable choices and decisions in our everyday lives to solve problems, but in more complex matters strategies for decision making must be developed. Our reason then becomes aware of its own course of action and becomes reflective.

16.4.3 Three discourses

Habermas (1997) distinguishes three kinds of questions and three corresponding discourses: pragmatic discourse concerning what is appropriate, ethical discourse concerning what is desirable according to the group´s (collective) value system, and moral discourse concerning what is fair. In this Habermas relies on Kant, Charles Taylor and Aristotle. He also mentions the hermeneutic process of self-understanding as means for a critical approach to oneself and one´s attitudes. In the working model the group´s (collective) value system should preferably have been discussed in advance and developed during the earlier meetings about the different professions' doxa and the different participants' horizon of understanding and self-understanding as suggested above.

Different performances are expected from the practical reason, from the appropriate, the good and the fair aspects in these three questions and they are complementary. The pragmatic part is conditioned by subjective goal and addresses one´s own resourcefulness while the ethical part is conditioned by the purpose of living a good life and addresses self-realisation and the determination necessary for this, and the moral part is conditioned by self-imposed laws and addresses free will which is autonomous in the respect that it is determined by moral insight.

Decisive arguments in the pragmatic discourse are related to empirical data, preferences and objectives, and also to evaluate the consequences of the alternatives. In the ethical discourse aiming at value matters, the decisive arguments should concern what is valuable for all, and arguments for the moral discourse should show what lies in the equal interest of all participants. Moral judgements about actions aim at clarifying behavioural expectations in interpersonal conflicts because of conflicting interests. In this case one has to motivate and use norms of reciprocal obligations and rights. In a corresponding moral-practical discourse the action should be a mutual understanding of a solution of a conflict within the limits of the norm-regulated area. The resulting decisions must be supported by these different discourses, but the basis must simultaneously be the right to private autonomy and individual freedom of action, according to Habermas (1997). Applied to the working model, this implies that all professions must consider their arguments and reflect upon them together, weighing them in the discussions about suggested measures, not only in a pragmatic sense but maybe also in ethical and moral sense if applicable.

16.4.4 Different situations and actions

In an actual situation of complexity with a group of individuals it can be difficult to determine what kind of problem there is and what discourse is of use for solving it. Either it is about solving a conflict that has occurred through incompatible actions or it is about determining collective goals and jointly pursuing them. In the following Habermas (1997) is referring to Talcott Parsons. In the basic case the conflicting actors want to settle in agreement or the actors might be facing the same difficulties, which they jointly can dissolve. In the social interaction the actors expect the others to have choices and a social order with coordination of actions such as impact and consensus is needed for support. Without coordination the participants experience that there is a problem, which can occur both when the case is about conflicting orientation of actions and when it is about collective projects requiring joint efforts. A system for interaction is needed for relief and complementary combined with the actors' reflexive ability of mutual understanding to achieve a systemic self-stabilisation.

Basic interactions are limited by value-oriented action or interest-oriented action, and the action for coordination is then value consensus or reconciliation of interests. The motives are always mixed but by a thematisation of either aspect that aims to make the actors choose approach either as an understanding-oriented actor or as an objectifying actor who, based on their own preferences, is oriented to conciliation.

Depending on the actors' perspectives and choices of action the strategies for problem solving can be laid out as shown in the upper boxes in table 16.1 below. Understanding oriented praxis and negotiation praxis both aim at agreement, but are distinkt from each other in that the former is experienced as reaching consensus and the latter as a balancing of interests. The former invokes consideration for norms and values and the latter assessment of interest constellations. Table 16.1 shows the combination of classification of actor perspective and coordination problem and the criteria for the basic strategies of problem solving.

Problem: / Coordination of action through:	Solution of interpersonal conflicts	Strive to achieve collective objectives and programme		
		Establishing objectives	Implementation	
Value orientation	Consensus	Decision through authority	Commanded power with organised sharing of work	
Positions of interest	Conciliation	Compromises		
Rational collective will formation	Impartial balance of interests from a fairness perspective	Reasonable compromises and discursive unanimity about goal and programme	Rational implementation of goal and programme	
	Expectable observance of norms	Authorization	Neutrality	Unsolved problems

Table 16.1 Classification of the basic strategies for problem solving (Habermas 1997 p.37).

Consensus and conciliation are keywords for the strategies of conflict solutions. In value-oriented action, ethical norms or laws and regulations can be an authoritative possibility for decision making. In interest-oriented action, the negotiation for balancing of interests can be solved in the group or team or a compromise can settle the problem, but a third person, an external mediator, is another possibility, according to Habermas. In the working model this would be a fourth person as mediator.

The keyword commanded power with organised sharing of work points out that, for jointly achieving the objectives, an organised division of labour based on power or authorisation is necessary. Consensus is good, if possible, but in some cases the interests must be balanced, and Habermas´ concept of rational collective will formation provides a useful framework for this reaching beyond the compromise.

Collective will formation is, according to Habermas (1997), a common and reflexive effort to solve problems with coordination of actions that cannot be completed on the basic interaction level. The solutions on the basic level described above are based on discursive argumentation, but they are dependent on power positions and different power constellations that are expressed in terms of prestige or hidden behind normative beliefs. A transition to a 'rational collective will formation' implies that the strategies for problem solving would be resolved from their connection to such conditions. The pragmatic, ethical and moral use of the practical reason described earlier is then already activated. The reason earlier described as an individual ability is now transformed into different forms of inter-subjective understanding praxis and negotiation praxis. The coupled strategies for problem solving will be conflated in the rational discourse practises.

As soon as a value-based consensus is broken and the reflexive normatively based action kicks in, the wish and need for valid norms is raised, according to Habermas (1997). In this the impartiality within the moral perspective comes into use. In moral discourses the participants assume that each one extends his or her own perspective to include all the other perspectives. Norms founded in this sense talk about duty to act in accordance with each individual´s interest and with everyone´s common

interests. In this way the conflict between interest and value orientations is without significance, and conciliation in a conflict is transformed into an impartial balance between interests in the light of previously recognised norms. The fourth external person, the mediator mentioned above, can help to consider what norms and standards are applicable and how to use them. A similar integration of interests and values occurs when discussing collective objectives and programme. The starting point is the pragmatic discourse in which, within a framework of a common horizon of value orientations, one can test alternative strategies for action. When the consensus about objectives and preferences disappears, and conflicts of interests emerge, those conflicts can be bridged by reasonable compromises and dissolved by processes of hermeneutic self-understanding.

Thus will formation has several dimensions, including morality, and is available also from the aspect of ethical self-understanding and is worth considering from the viewpoint of reasonable conciliation of interests. This could be applicable in a special situation within the working model where the law and moral concerns collide. If the national legal system sometimes contradicts itself by demanding energy efficiency in buildings considered for alteration and simultaneous cautiousness of cultural and historic values to such high extents that the demand in the regulations cannot always be met, there could be a solution. If Habermas´ concept can be used as a working method in reality, this is a matter that could be solved by the three professions. In practice a situation that has been stalled can then be transformed and become a situation where some freedom of action or discretion is given.

16.4.5 Negotiation

Negotiations on compromises are the core of a rational collective will formation considering objectives. They are suitable where it comes to disciplining power relations. Compromises will only be considered rational, however, when they ensure the same amount of influence to all parties. It is not about mutual consensus between discerning actors, but a problem occurring when actors commissioned with power must come to an agreement. Procedures to ensure that compromises are seen as reasonable must, however be justified on the basis of the moral aspect. The negotiation is in this way already imbued with something normative. Compromise formations are reasonable when argumentation is not enough. When objectives and preferences are not clear and furthermore touch important value positions self-understanding is questioned and the discursive will formation extends to the collective identity. Traditions that we are brought up with and have adopted as our own determines our image and how we recognise ourselves in this social cultural heritage, but the authoritative value consensus is resolved or transformed through discourses of self-understanding. These discourses enable critique of value beliefs and also serve the common acquisition of authentic life-orientations.

This is the ‘rational collective will formation’ in which an impartial solution of interpersonal conflicts, free of ideologies and power constellations, is enabled by moral motivation discourses and application discourses on the one side. On the other, pragmatic discourses are linked with compromise formation and ethic-hermeneutic self-understanding to a discursive will formation, which principally enables a reasonable solution for problems with setting objectives that are not withheld by prestige or power constellations.

Some problems remain unsolved, however. In solving conflicts it is a question about what right we have to expect observance of norms, and in setting objectives collectively it is the authorization. The validity of a norm is tested in moral discourses and shows in everybody’s observance. However, this does not constitute sufficient conditions in a larger context, according to Habermas (1997). He claims that morally valid norms must be transformed into legally binding norms in a society.

The discursive will formation on collective objectives has a moral component, but still cannot be comprehended as an inter-subjective knowledge process like the insight gained when compromise formation and ethical self-understanding is tightly intertwined. Collective objectives and programmes are developed, motivated and decided on. The decisions do not give a sense of powerlessness, which can be the case when an autonomous will allows itself to be guided by moral judgement. The setting of objectives must continue with implementation which demands an effective and neutral executive body that is not guarding an authority's own interests. However, the rational collective will formation cannot be seen as a process generating power; Habermas (1997) claims that it must be connected with political power to enable transfer of powers, and control the exercise of these powers.

The levels Habermas goes on to describe are not applicable for the working model in this thesis and this is why the analogy stops here.

16.5 Methods in systemic thinking

16.5.1 AI and CMM

Something that unites and supports the three different professions is *systemic thinking*. One basis for systemic thinking is the constructivism perspective. There are methods and tools in common use like appreciative inquiry, AI, which is a positive relational approach to change, helping people to find solutions instead of defining and dwelling on problems. In Wenger's *Communities of Practice* (1998) the '[c]onstructivist theories focus on the processes by which learners build their own mental structures when interacting with an environment. Their pedagogical focus is task-oriented, and they favour hands-on, self-directed activities oriented toward design and discovery. They are useful for structuring learning environments'.

Cooperrider and Whitney (2008) have described the five principles and scholarly streams central to AI's theory-base of change as follows.

The Constructionist Principle: Simply stated— human knowledge and organizational destiny are interwoven. To be effective as executives, leaders, change agents, etc., we must be adept in the art of understanding, reading, and analysing organizations as living, human constructions.

The Principle of Simultaneity: Here it is recognized that inquiry and change are not truly separate moments, but are simultaneous. Inquiry is intervention.

The Poetic Principle: A metaphor here is that human organizations are a lot more like an open book than, say, a machine. An organization's story is constantly being co-authored. Moreover, pasts, presents, or futures are endless sources of learning, inspiration, or interpretation.

The Anticipatory Principle: The infinite human resource we have for generating constructive organizational change is our collective imagination and discourse about the future.

The Positive Principle: Building and sustaining momentum for change requires large amounts of positive affect and social bonding, and sheer joy in creating something meaningful together. We are more effective the longer we can retain the spirit of inquiry of the everlasting beginner. The major thing we do that makes the difference is to craft and seed the unconditional positive question.

There is also Coordinated Management of Meaning, CMM, which is a model and method for coordination of action and meaning developed by Cronen and Pearce. Hornstrup et al (2012) uses CMM as a tool for analysis and intervention to solve problems. By looking at and reflecting on speech and action, new perspectives and possibilities for understanding are created with the aim of moving from divided meanings to coordinated meanings. Meaning, in the personal sense, distinguishes from one system, group of individuals or organisation to another, and it is not possible

to achieve full common understanding, but by sharing 'stories', understandings and actions could be coordinated.

The main approach that Hornstrup et al (2012) describe is based on systems theory and the systemic-constructivism thought on practice in organisation. They also refer to Bateson and his expression 'information is a difference that makes a difference'. This is meta-communication or message about the message which implies that it is the way, it is *how* information is communicated that is important. It has to be communicated in such a way that the receiver perceives it as useful. There is actually another word for this: rhetoric which is also discussed in this chapter. Only in this way can we coordinate our understandings and thus coordinate our actions, according to Hornstrup et al (2012).

In social constructivism the processes of dialogue is important: being aware of that language is not a passive state. Humans actively create the world they experience through language. Hornstrup et al (2012) write further that people are bound together by taking part in different language games that become links between actions and understanding and hence also between the interpersonal relations co-created in an organisation. In practice this also implies that if one talks about problems, mistakes and shortcomings, then *that* is what one sees. Connected to the idea about appreciative inquiry, language contributes to a focus on the most important and valuable and positive experiences. Hornstrup and Johansen (2009) on the other hand assert that *all* experiences are important from a learning perspective. Not using this potential for learning comprising both success and shortcomings would be a waste of resources and experiences, and a diversity of coordinated 'stories' can contribute to new insights. The objective for developing a diversity of understandings and interpretations is the creation of possible new coordinated insights and understanding where all views and positions in a group or team are equally weighed. The most important asset to supporting a reflecting team's development is *curiosity* which is needed for the participant's ability to take part in equal dialogues, to listen without prejudice, and to ask explorative questions, which are decisive for the interaction and learning perspective.

16.5.2 Systemic meetings

Within systemic non-linear or circular and dynamic thinking the world is comprehended as complex and prediction or control over how people will react to a certain action is not possible. All one can influence is one´s own actions and these will also affect the system (Ainalem 2013b; 2013c). If a situation arises during discussions or negotiations while working with the designed model, where it is necessary to bring in a neutral mediator, as suggested in Habermas' communicative rationality theory, a systemic approach taking human complexity into account would be preferable. When there is no obvious need for involving a neutral mediator the process in a systemic meeting could be used as a routine for continuous reconciliation for maintaining a good working climate, when there is a need to clarify a problem/solution and its consequences, and when there are diverging opinions with equally strong arguments for a solution/measure.

To distinguish the management in a systemic meeting, Sarv (2013a) uses the notion of system setters, those who perform the responsive leadership, while those who act are system actors. Transferred to the working model the client/owner of the premise would represent the system setter. In the meetings they will learn to use the same language by making visible, and understanding, each other's *actual* everyday problems, visions and ideas and the relationship between vision and reality, which leads to a learning organisation. The starting point for systemic thinking is that change and learning takes place continuously. Each sequence of events, or story/narrative, gives causes for reflection and experimenting, which is the *really important* thing since that is what ultimately determines the quality of what is performed or produced. The methodology presupposes an approach of taking

responsibility and learning in a continuous process, which is trained in the systemic meetings. There is an important difference between a knowledge system and a learning system. Where the former is reducing and can be organised and also purchased, the latter is not. A learning system only exists where people interact and are willing and allowed to expand their knowledge (Sarv 2013b).

For knowledge to become actual learning, internalised within a person, active reflection and dialogue are common because theywork. A learning system uses feedback for development of the team, and is open and expanding contrary to the structure of an organisation for sheer production which is usually a closed and reductive system. A system that is open, complex and independent from the (organisational) structure, and based on knowledge, learning methods and also practice, is a prerequisite. It takes advantage of human resources, complexity and dynamic effects supporting *action in* an organization, giving *power to*, and complementing knowledge of system which is *knowledge about* logistics, quality and security, and the structure's taking *power over* in an organisation (Sarv 2013b). Both are parts of everyday life in an organisation.

Argyris´ (1993) notion of 'theories of action' is in part about how people create mental maps to follow in action – maps they plan to follow, but in reality do not. Argyris believes that it is reality that governs human behaviour rather than action based on maps and theories, as people believe. There is thus a gap between how people actually act in a certain situation and how they think they act. This could actually be revealed in the systemic meeting.

All descriptions of reflecting activities, both individual and in group, in this chapter has some similarities to Schön's *The Reflective Practitioner* (2011) in which 'reflection-in-action' is used for a reflective conversation with the situation, and the work of the architect is described, among other professions. Simply put, many of the ideas and methods within the described concepts are from an architect's perspective – familiar.

DISCUSSION AND CONCLUSIONS

17 Discussions and conclusions

17.1 Summary

The overall research aims and objectives were two. The first was to design an application-oriented working model for an integrated balancing of energy efficiency, preservation requirements and architectural qualities with the aim of not diminishing tangible and intangible values in our cultural and historical built heritage. The second was to make a theory-based design for working methods for the collaboration between the professions involved, with the aim to create reflection, understanding and transparency and a good working climate in the early stages of the working process in preservation projects.

This thesis gives suggestions for how to work with the difficulties that exist within the new combined field of energy performance, cultural historic values and architectural qualities. The results are a working model with supporting methods presented in chapters 15 and 16. Looking into this multidisciplinary area in theory and practice required both interdisciplinary and transdisciplinary work and approaches. This new combined area has been researched by means of a case study investigating five units of analysis using seven methods, of which the one arranging workshops, forming a transdisciplinary arena, has been of great importance.

Phase 1 had a 'bottom-up' perspective investigating the units by applying the case study to a regional project, the Halland Model, the buildings and the actual outcome of the restorations, testing of the methods for assessment, mapping the legislation, and describing the components in the management and actual teamwork enabling its success.

The main conclusions in Phase 1, which was concluded with a licentiate thesis, summarised in chapter 4-7, showed three outcomes. One was the risk that intangible values in our built cultural heritage may be lost in favour of measurable and tangible energy efficiency actions. The second was the risk that excessive cautiousness about our built cultural heritage may prevent actual efficiency potential from being realised. The third was that the different perspectives of energy efficiency and preservation of cultural values actually could converge, meet and be balanced.

A conclusion concerning the regulatory framework for the new combined area was its ambiguity and difficult to keep track of all different rules, based on interviews with municipal officials. Another conclusion was the reliability of common assessment methods, but also that in the third unit of analysis, the area of architecture, there were no Swedish guides on how to assess architectural quality corresponding to the guides available for heritage values and energy audits.

Phase 2 had a 'top-down' perspective and concentrated on the question of whether the combination of preservation and energy efficiency actions could be performed in a way that both conservation officers and energy counsellors could accept. The conclusion is that it is possible, based on outcomes from the workshops and the designed working model and methods.

The foundation for results and conclusions achieved in Phase 2 consisted of (a) the practical-theoretical case study and its results from Phase 1; (b) the outcomes and empirical material from workshops arranged as a transdisciplinary arena inviting both academia and practice, as a basis for an iterative design process; and (c) the study of methods, approaches, theories and concepts used in practice and described in literature with the aim of exploring how theory can be of use for practice, in practice. The case study methodology was used by adding supplementary descriptions and analyses necessary for designing the working model and methods for integrated balancing of demands. The following is a presentation of discussions and conclusions made in Phase 2.

17.2 The working model

17.2.1 Conclusion on the working model's concept, structure and process

Collaboration is first and foremost a matter of communication, and secondly a matter of the different assessments and the professions' arguments. Thirdly it is about the proposed measures and their consequences, which the assessments and discussions have led to, and eventually their manifestation in the physical objects, – the buildings.

The working model has been developed as a process for use in the first stages of planning and programming for a preservation project. The outcome of the initial work defines two things: A programme for preservation of cultural historic values, energy efficiency measures, and architectural qualities adjusted to individual objects; and working methods for collaboration adjusted to the individual profession´s ability to analyse, synthesize and for knowledge production. Both parts are based on the professionals' knowledge, experience and skills, and work strategically through out the whole preservation project.

All professions have their special knowledge and all are of importance for the result of the preservation. Together they must see to it that the building meets the client's needs, demands for security, function and appearance, and that the building, as far as possible, conforms to legal requirements. The conclusion is that the work demands communication and dialogue and it should start early in the process because collaboration is a *socio-cultural activity* which needs an early start in a process to work throughout. It is further concluded that in this work it is important that it really is a collaborative effort among all engaged professions, and that the construction client has an important unifying role. It is in the client´s interest that a collective discussion and interdisciplinary dialogue are implemented to illuminate the possibilities and difficulties of the preservation or alteration project.

The working model comprises seven steps in which four documents are used for a process in which inventories, discussions and negotiations are essential. When the building and the proposed measures are discussed, transparency is vital for understanding of the basis for the different measures and what is to be achieved. The consequences of every measure need to be illuminated from various angles to get a picture of the results. If this is achieved then one has created good communication as a condition for the balancing that has to be carried out during the process. It is all about understanding the relation between *the arguments* behind a proposed measure and *the consequences* for the building if performed. It is this *relation* that must be weighed.

17.2.2 Conclusion on a common denominator

Considering all different professions it was concluded that a common denominator was needed. Not all historic buildings are listed buildings, and buildings are to be used, thus the indoor climate is the one factor in the balancing that all professions can agree on, and also should have knowledge of. It may therefore be a good start in the discussion. Sometimes one has to accept that the building´s energy performance is less improved than it could have been in order to preserve inalienable cultural and historic values, but still with a good indoor environment. This refers to good thermal performance and air exchange, adopted to and suitable for the people and activities in the building, and the building's ability to withstand moisture conditions without risk of damage, and without risk of people's health. Sometimes one has to accept the loss of cultural historic values due to the building´s physical condition and energy performance in order to obtain a good indoor environment.

17.2.3 Discussion and conclusions on the working model

The balancing process is based on four parts: mapping, analysis, prioritising and synthesizing. It is an iterative process where the first part consists of the inventories or the mapping of the three views: energy performance, cultural historical values and the architectural view. The second part is the analysis and the individual choice of measures that suit the building and its intended use. This is followed by part three, with discussions in which all professions take part in order to determine the necessary priorities. Finally, the fourth part brings on the negotiating and synthesizing to arrive at a joint decision.

Project management usually involves managing measurable requirements using checklists in coordinating and controlling a project from concept to results. It is about documenting *what*. The documents produced in the EEPOCH project for the working model, however, have been designed for a process ─ not as checklists – for possible ways *how* to work. Four documents with accompanying explanatory texts have been designed as a framework, and by using them a clear work process in seven steps is provided.

The process starts with an agreement between the owner and the engaged professionals and the first basic protocol is used for the mapping. The first assessment of the building´s status is made by professionals. Proposals for possible measures are listed in a separate document together with the arguments and motives for the measures. The consequences for the proposals should be considered and the measures valued along a four-graded scale in an overview chart. When the three professions separately have documented their choice of measures suited for the building, the three different overview charts are compiled into one. It will point out which proposals may collide and which proposals that can be accepted directly. This is the step where the arguments are necessary in the discussion and negotiation for arriving at an agreement on unified proposals or a decision for further investigations. The client makes the final decision. The process is iterative and the results can be reconsidered at every step and a previous step revisited.

In step 4 the expected results of the suggested measures are placed on a four graded scale in the overview charts.

1. High improvement/achievement/enhancement of values, performance, quality
2. Improved, increased values, performance, qualities
3. Diminished, decreased values, performance, qualities
4. Big decline, diminishment of values, performance, qualities

By using a four graded scale one must consider the outcome of every suggested measure very carefully and try to see the balance or imbalance of the pros and cons. The four-graded scale may seem provoking but the aim is to make the professionals take a stance and answer the question: Does the measure improve the building's performance, values and qualities? We define values by characteristics, possibilities and limitations, quality and quantity. Which of these are so important and significant that the building would be transformed into something else if they disappeared or if something was added? This question must also be answered. Furthermore, valuation always implies some kind of subjectivity to a greater or lesser extent.

17.2.4 Discussion and conclusion of the valuation situation

The main and the most common subject matter or topic discussed during all workshops was questions of values, how to assess and evaluate them and how to define or determine them. The subjectivity issue has been a common theme, or worrying guide, throughout this work, leading the design of both the working model and working methods. Subjectivity is part of every assessment situation, be it historic values or other, since value initially is attributed by a valuating subject. In this

regard value is a subjective matter. This of course has an impact on the valuation, but it can be reduced to a certain degree. The reduction of subjectivity is what normative valuation methods aim at. This was an on-going discussion crucial for the work, because how can one make a balance of values and consequences of measures without knowing what to balance? It seems that it takes professionals with great routine and experience to solve this issue. Cultural historic values, architecture and energy performance cannot be assessed only by a template and weighted evaluation factors. All should be assessed in context and by experienced professionals with trained eyes. This is a prerequisite and the only appropriate way to use the assessment guides, investigated and summarised in chapter 5 and 6. The ability to assess is an acquired skill and that skill also includes the ability to provide rational arguments and set good reasons for the proposed measures.

The matter of subjectivity was also part of Workshop V, summarised in chapter 14, in the discussion by Svahn-Garreau about subjectivity as a paradigm shift in conservation. The three stances of subjectivism, value objectivism and value relativism were presented and there are arguments for all three, but the conclusion in this thesis is that there is a fourth stance which is described in chapter 15. Everything can be relative in the sense that it is related to people, their beliefs and the common assumptions prevailing within a group of people. Distinctions between objectivity and relativism are only possible in a human context in which people are autonomous and responsible for their decisions. Rational choices can be made preceded by negotiation or discussions. One of the conditions for a fruitful discussion is space for qualified criticism – a criticism that is aware of its starting points and its quality criteria, and which presents them and is able to use them as tools for valuation and assessment. A prerequisite for a fruitful discussion are different perspectives that come together in a dialogue. Despite the different starting points and perspectives of the three professions, they still have much in common and a discussion about the properties, qualities and values is possible which also has been proven at the workshops.

Muños Viñas (2011) writes about the inter-subjectivity, referred to in Chapter 13. From ‘classic’ restoration and its focus on the ‘object’s true appearance’ to focus on ‘subject’ that is the meaning, values and function an object has for the affected people. Leaving the ‘classic’ truth approach gives cause to inter-subjectivity, but this can be balanced by the sustainability approach. Economic, environmental and social sustainability are natural and uniting approaches in the necessary cooperation today. There is economic sustainability connected to tourism, for example, and ecological sustainability in choice of energy source, materials and techniques for the preserving work in conservation. Sustainability can then also be applied to the object’s significance. In this sense sustainability is similar to reversibility or minimum of intervention – to take future uses and users into account when decisions are made, for them to use or take part of the significance in the future.

17.3 The working methods

17.3.1 Discussion and conclusions on professional similarities

Although there are many professions involved in preservation work, there are professional experiences that are closely related, showing possible connecting points as a start for interdisciplinary and transdisciplinary reflections and discussions. The professionals use their ability for interpretation when making assessments and they are trained for analysing and synthesizing. One important conclusion is that the difference between the nomothetic natural sciences and technology and the idiographic Humanities is not clear-cut. A connecting conclusion is that all professions use a mix of systems thinking and systemic thinking when predicting the future and when understanding the particular, and old polarized views are obsolete which is described in chapter12 and 13.

Furthermore, all three professions working with existing built heritage have a relation to time and use of the building and a constructive approach, creating specialities connected to their professional skills as described in chapter 13. One generalising conclusion was that the engineer *works with problems to create* special solutions, the architect *works with possibilities to create* special conceptual design, and the conservation consultant *works with history* in all its aspects *to create* special preservation and maintenance plans. These are generalising comments but help to frame the similarities. The conclusion is that all three professions actually create something of what already exists. Interacting with other professionals and their knowledge as was the situation in the transdisciplinary arena, becomes a matter of creating something new that is more than the sum of the different parts. It is related to the fact that transdisciplinary work differs from transdisciplinary analysis which was described in chapter 8.

17.3.2 Conclusion on mediating relational aspects

One can discern some important aspect in earlier restorations, in the Halland Model in which the collaboration worked out well. An analysis was made in chapter 11 of interview material to extract the essence and to identify aspects that had a relational and mediating nature connecting the other aspects found. The conclusion was that *communication, understanding*, *equality* and *transparency* were important mediating relational aspects. These aspects touched on the professional's knowledge and methods and how they were used. A first condition was the respect for each others' knowledge and an understanding of what each profession brings to the project. This demanded horizontal organisation with equal responsibility, a settled framework where the roles were defined and clear meeting procedures established. If there is insecurity in these practical matters there is a risk that the discussions are characterised by uncertainty.

17.3.3 Conclusion on participation

One important conclusion and decision, made at workshop V, along the way of designing the model was that all the different professions need to act without constraints and it would be unwise to design one strict method for all or to try to reach consensus by creating a strong idea or vision that everyone have to accept. That would neither be taking care of their creative ability nor their synthesizing ability and special expertises. The methods build on participation, on reflecting and consulting together, but one cannot require participation from another. Nor can one get it. A decisive conclusion is thus, that the only thing one may require, receive or give, are good preconditions for participation.

17.3.4 Discussion and conclusion on the chosen stances

Some philosophical stances and stances in social constructivism were used as an illustration for the mediating relational aspects mentioned above, and are described in chapter 16. They were chosen for supporting the professionals' individual position and valuation, but also the social interaction and collaboration between them. For interpretation and understanding hermeneutics has been presented; for equality part of Habermas´ communicative rationality (1997) has been described; and for transparency and communication doxology, (Rosengren 2008), rhetoric (Perelman 2013), and systemic thinking (Ainalem 2013) were introduced. The conlusion is that doxology and the use of Perelman´s rhetoric and universal auditorium, which is always there judging the speaker even if only in the speaker's mind, is one answer to the issue about finding right arguments. The choice of stances is also based on confidence for the professionals and relying on them to cope with the situations that arise without a direct leadership, to manage the conducting of negotiation and direct-democracy collaboratively.

Furthermore, one conclusion is that systemic thinking could be considered a practical doxic knowledge while taking human action into account. Just as both systems thinking and systemic

thinking are necessary and complementary for practical work, so are episteme and doxa for theoretical work. Understanding the involved professions´ specific skills and disciplinary matrix was important for conceptualising possible designs for methods of collaboration. For this purpose, among others, a systemic meeting was tested in Workshop VI. It is a method developed for organisations to facilitate and improve understanding and communication between different professions. The questions about collaboration and understanding were highlighted in the systemic meeting. The client/emloyer´s responsibility was emphasised, but first and foremost the individual´s responsibility and the need for knowledge, through the actors' processing of the narrative.

Personal autonomy is described by Sarv and others, referred to in chapter 16 and the concluding discussion in Workshop V – giving people space for independent action, not limiting people´s ability to act , and trusting other professions´ knowledge and skills, which is a major experience from all the workshops, have been decisive for the design. Together this describes the core of the working methods, and the design takes this into account. The aim in chapter 16 is to emphasise the importance of reflecting in the valuation situation for making balanced proposals of measures. The professionals have different interpretations, which may lead to conflicting proposals. Only through all concerned participants´ equal and non-coercive participation can the readiness to learn occur that is necessary if a conflict about values should mature into a conscious decision.

The conclusion is that our way of approaching a conflict between different interpretations is, in itself, a question that can be processed only within a framework for a conversation, or a discourse, as Habermas would call it, in which all interlocutors treat each other with respect. A framework could be represented by Habermas´ (1997) concept of 'rational collective will formation'. Hermeneutics can be a tool for defining the different professions' cultures or doxa, to find their roles in them as the basis for making what Habermas calls a 'conscious decision', which is a kind of decision that cannot be delegated. In this context it becomes obvious that every act of interpretation includes the possibility for an altered interpretation. Thus one's own or one's profession's culture can be altered.

A major conclusion is that the working model and methods provide, and work as a trading zone defined as an active arena for negotiations and a field of knowledge production corresponding to the different actor´s skills, values and facts, competences and resources. The designed model facilitates reflection in the valuation situation, by letting the building itself and the professionals' knowledge and skills guide the choice of measures, in making responsible decisions.

The collaboration belongs to the systemic thinking that is needed when people with different experiences and interpretation interact. Furthermore, there are laws and regulations concerning our built environment with somewhat contradictory requirements to fulfil. This contradiction is one of the concerns for this thesis and becomes clear for those involved in an actual situation where the measures and their consequence are discussed and decided on. If the legislation had been clear about this issue, the situation would not have been as complicated as it actually is. The valuation situation has been handed over to the heritage sector and building sector for professionals to decide which legal requirements to meet because all of them cannot be met, at least in the objects analysed in this thesis.

17.4 Discussion and conclusions on legislation

Long-term sustainable management of cultural values in our built heritage presupposes change triggered by the need for low operating costs and sufficient space for the functions required of the building. There must be an economy for the maintenance of existing values and new functions for the buildings otherwise there is no incentive for the owners to preserve them. Balanced energy measures

and preservation can, at best, result in both low energy use with low operating costs and better indoor climate, and thus contribute to decreasing CO_2 emissions. Uniting these perspectives, however, seemed discordant when reading the legislation on energy efficiency in the built environment.

The legal requirements concerning both preservation and energy efficiency, and what measures that is possible in the built heritage, have been investigated in chapter 10. The objects investigated in this thesis and the example described in *Potential and policies for energy efficiency in Swedish historic buildings* (Broström et al 2014), another project within the programme *Spara och bevara* and presented at workshop V, show energy performance above the legal requirements. Meeting this demand with preserved cultural historic values was not possible. The conclusion is that the requirement is difficult to meet, but the overall target of 20 % CO_2 reduction is possible to meet and also with much more than 20 %. If the energy use is dealt with primarily from the overall climate perspective, then the choice of renewable energy sources that do not increase the amount of CO_2 emissions in the atmosphere should be prioritised.

An acknowledgement of renewable energy sources in the regulatory framework concerning requirements for energy performance is suggested. This would be an adaptation to European and national targets for reducing greenhouse gas emissions. It would also be a step towards decreased dependence on imported fossil fuels. Taking the energy source into account when applying for a building permit for alteration, it would enable existing buildings to meet the requirements without risking distortion of cultural and historical values, but this issue can only be dealt with and decided on by national politicians.

The two main laws the Planning and building Act, *SFS 2010:900*, and the Environmental Code, *SFS 1998:808*, both states the importance of energy efficiency and protection of the built cultural heritage, but the law Planning and Building Act is not sufficiently detailed to be used on the level of handling building permits which is a deficiency according to interviewed municipal officials and discussions at workshops. Looking at the other laws, regulations and mandatory provisions the conclusion is that there is a difference between how the two areas of energy and cultural built heritage are managed. The most significant when comparing the two areas is that there are two special laws concerning the energy area separately with no equivalence in the area of the built cultural heritage. It is the law *SFS 1977:439* and the regulation *SFS 1977:440* on municipal energy planning for energy supply, distribution and consumption which should be monitored and updated regularly. There are no laws and regulations for municipal heritage planning to assess cultural historic values in the building stock, which should be mapped and updated regularly. Then there is the law *SFS 2006:985* and regulation *SFS 2006:1592* and mandatory provisions *BFS 2007:4 - BED 1* on buildings´ energy performance. The declaration should contain economically viable proposals for energy efficiency actions with the overall purpose of promoting sustainable development. There is no law, regulation or mandatory provisions on buildings´ cultural historic values, and no demands for declarations containing economically viable proposals for preservation measures with the overall purpose of promoting sustainable development.

A confusion of ends and means seems to be the result when energy issues are pursued unilaterally. Prioritisation of energy and climate issues in the regulatory framework supports this. It seems that instrumental rationality prevails, reflecting a value rationality evoking a belief that energy efficiency is an end in itself and not a means and thus turned into value irrationality, exemplified by the emphasis on the energy issue at the expense of cultural values. One conclusion is that a review of the legal framework for a balancing of interests is needed, but this is a matter for national politicians to look into and decide on.

17.5 Reflection over methodology

17.5.1 The case study methodology in brief

The methodology chosen was a case study according to Yin (2009), with multiple units of analysis for a qualitative study of the new combined field of energy efficiency, cultural historic and architectural values and the balancing of interests in our built cultural heritage. The units were jointly decided in Workshop I: energy efficiency, cultural heritage values, architectural qualities, legislation and finally management and teamwork.

In Phase 1 a linear systems thinking used for explaining complicated issues dominated, belonging to the Mode 1 paradigm, as described by Gibbons et al (1994). A 'bottom up' investigation was made of the five units of analysis and the case study was applied to the buildings and the three professions' assessment methods, to legislation, and to the professionals' collaboration and processes for managing the Halland Model. Simultaneously a transdisciplinary arena for academia and practice was started for sharing of knowledge and skills.

In Phase 2 a non-linear systemic thinking used for understanding complex issues dominated, belonging to Mode 2, as described by Nowotny et al (2001). A 'top down' investigation was made for wider and deeper description and analysis of the five units of analysis, combined with further development of the transdisciplinary arena facilitating an iterative design process. In Phase 2 the case study was applied mainly to the legislation, the professions and their collaboration and management since they have the knowledge and are the ones performing the balancing. The literature studies were focused on practice and understanding of underlying theory; philosophical stances, paradigms, structures, processes and methods. The different parts in each phase demanded different analysis methods. In Phase 2 the architect's designerly way of thinking and conceptualising has been used for the actual design of the working model and supporting methods.

17.5.2 Conclusion on the chosen design strategy

The research design provided a methodology with a strong yet permissive structure for mixed methods, approaches and units of analysis. The case study was planned for three units of analysis but was after the very first workshop complemented with two more units to comprise five units of analysis. The conclusion is that the research design has been working out well. The choice during the work with this thesis has been to involve practitioners from the very start in the creative parts throughout the whole design – to let their experience and knowledge form the basis for designing the working model and working methods theoretically adjusted to practical conditions. This has been made as part of the design strategy for the chosen methodology and especially regarding the implementation phase. Their involvements have made it possible to respond to, and think through and process, what actually is needed in the valuation situation and collaboration. Their involvement and their commitment during the project was a prerequisite for the project on the whole, and the primary evidence that collaboration across disciplinary boundaries is not only possible, but also that it can work out well.

17.5.3 Advantages of conducting interviews and conclusions drawn

The interviews have made it possible to get access to knowledge and experience from practice, otherwise unattainable for theoretical study. Investigating the Halland Model for formulating the basis for the working model would not have been possible without interviews. The applicable regulations and laws and the difficulties for their implementation have been clarified by interviews with officials. Interviews have also enabled a wider view of organisational theory applied in practice thus decisive for development of the working methods.

17.5.4 Comments and conclusions about the approaches

This thesis shows that multi- and interdisciplinary work within the chosen topics, is needed and have worked out well in the transdisciplinary arena, but also that similarities in methods and professional work outweigh the differences. One core-conclusion is that all professions are important and architects must be open to other disciplines. However, the multidisciplinary, interdisciplinary and transdisciplinary *work* differs from inter-, multi- or transdisciplinary *analysis,* according to Seipel (2005). Multidisciplinary analysis draws on the knowledge of several disciplines, each of which provides a different perspective on a problem or issue, making a contribution to the overall understanding of the issue, but in a primarily additive fashion. This is the outcome from several of the workshops. Interdisciplinary analysis requires integration of knowledge from the disciplines being brought to bear on an issue so that the resulting understanding is greater than simply the sum of its disciplinary parts. It involves integration and synthesis, and requires action by different disciplines or by academia and practice in which case it refers to transdisciplinarity. This was the outcome especially of workshop VI where a systemic meeting was tested and workshop VII when the model was collaborately analysed and step 4 in the model was developed.

17.5.5 Comments and conclusions on the transdisciplinary arena

This thesis is a theoretical work based largely on many professionals´ knowledge, skills and practical experiences. The overall conclusion on the workshops is that arranging them as part of the research design was a very effective method to engage with all aspects, facts and perspectives and to share them. The general advantage of workshops is to receive and provide information that many people need and to process this information in discussions, which is something completely different from reading information, which in turn also requires a great deal of reflection and individual processing. The effect of participating and the respect for a topic when realising the skills needed for performance have been evident in the workshops. Knowledge production in the transdisciplinary arena became necessary for designing the working model and directing the work.

The professionals have provided facts and information specific to their professions and shared their, repeatable, good experiences, made reflections on the project´s results and suggestions for improvements of the research design and the different processes for a clear framework, and brought ideas for the design of the model and for its performance and for the valuation basis of the model, among many other things.

The professionals have simply made concrete operational proposal for the project, and they have been an inspiration with their vast knowledge. Comments made by the more than 100 participants show that the workshops were appreciated and each workshop also addressed themes of interest and importance for the different professions. One important conclusion in short is that it was a good advice and decision to involve many professions from academia as well as from professional practice in a joint investigation process for understanding the involved topics and for co-creation of the model.

There is one major conclusion to make from the outcome of the workshops concerning the different cultures within the disciplines. Communication has proven to be crucial and the limits of our different professional ‘languages’ also sets the limits for our abilities to coordinate our differences and collaborate, but this limitation can be overcome by respect for others skills, equality in practice, and transparency for mutual understanding. The conclusion of this experience, connected to the working model and methods was to let hermeneutics, doxology with rhetoric, and systemic meetings be part of and illustrate the methods.

17.6 Other issues raised in the introductory chapters

17.6.1 Conclusion on the need for further development of the new combined field

The first issue found was the lack of scientific publications about this new combined field of energy efficiency, preservation of cultural historic values, and architectural quality, and of balanced measures in our built cultural heritage. This indicated a knowledge gap, but the conclusion is that there are research projects focused on the new combined field. The EEPOCH project fills a small but meaningful function in this context. Many projects are carried out in practice, which seems to be significant for the new combined field, but documentation of the results are often not available. A report based on interviews and made by Riksantikvarieämbetet in 2010 stated that the knowledge base on energy efficiency measures in built heritage within Swedish County Administration Boards and in the Church of Sweden needs to be increased. A prerequisite for a knowledge base is available information. The issue was equally emphasised when interviewing municipal officials in Phase 1. They did not have the expertise to assess the consequences of suggested alterations properly and did not know where to find the proper information. The conclusion is that more studies and literature in general on the new combined field is needed for development of the field, and that it could be used in professional and vocational education as well. The two literature searches in 2010 and 2014 still demonstrate the need for investment in and focus on this type of research project.

17.6.2 Discussion on use of the working model

One issue mentioned in chapter 2 was how big consulting companies' practices have changed, now often including both multidisciplinarity teams and their own research teams, which is something that is not possible for small businesses or small municipalities, which often lack experts such as construction management in their organisations. Small municipalities and small local companies are too small to stay current in the whole range of issues involved. The conclusion is that the working model and methods could provide a way of managing teams composed of different professionals coming from very small organisations and facilitate their collaboration and knowledge production, but the working model is equally suitable for use by teams in bigger consulting companies. One suggestion for use of the working model was raised in Workshop IX: it would be a suitable tool for bigger housing companies in need of inventories of their properties, as a base for their overall planning and for maintenance plans.

The designed model presented in this thesis is quite simple in its structure and easily comprehended. The supporting methods have sociological and philosophical stances described in international literature available in various languages. The common working process does not vary considerably in different countries and the designed model with supporting methods could be used in all kinds of early stages in building processes, hence relevant for use in other countries than Sweden.

17.6.3 Discussion and conclusion on inventories

One issue concerned the lack of inventories. In parts of Sweden there are no inventories on the historic built cultural heritage. The lack of inventories is problematic for the heritage sector as a whole. Identified valuable built heritage is the very first step to enable working with it. It is also a necessary tool for handling building permits due to the legal requirements for cautiousness. This has been a recurring topic at most of the workshops. This situation and the low availability of conservation competence over the years have remained relatively constant according to the follow-up of the National Environmental Objective 'Good built environment'. The conclusion is that addressing this issue on a voluntary basis does not work particularly well.

The first part or steps in the working model presented in this thesis could be a possible way to, fill this gap, or at least be seen as a complement. By making an inventory as shown in chapter 15 as a combination of historic and architectural values together with the building's energy performance, one gains an added value and the inventory can be used for optimisation and to get a better overview of the building's properties and possibilities. This is a great advantage compared to a single assessment of energy performance or an energy audit, and also better than making a single assessment of the cultural historic values because it takes the combination into account, which is more appropriate for a building whose life cycle spans decades and sometimes centuries, while the mechanical systems have a relatively short life cycle. It provides a structured way of working with this new combined field and also provides an overview that is often missing and would be of great help for buyers of properties and buildings. At Workshop V it was stated that there were fewer energy declarations made than expected and the conclusion is that considering the added value it would generate it could be worth a try to make the suggested combined inventories.

17.6.4 Conclusion on a guide for assessment of architecture

Another issue was the lack of Swedish literature on general methods for assessment of architectural qualities and values in existing built environments. While the architectural discipline is based on the art of making and the professionals constantly create and recreate the methods to suit the task at hand, and by necessity are using a multi-methodology approach with many methods, as briefly described in chapters 9, 12 and 13 this issue is complex. There are Danish, Norwegian and English general guides for assessment of architectural qualities and values that even laymen can use to understand something about assessing architecture. A parallel Swedish guide could also be of use for the municipal officials handling building permits where the board taking the decisions for permits are politicians and laymen. This issue came to the fore in interviews in Phase 1 and was discussed at Workshop V. Then there are the functional demands in the Swedish Planning and Building Act. The conclusion must be that it would be worth a try to let a combined group of architects and municipal officials write a Swedish guide with the legislation *SFS 2010:900 PBL Plan- och bygglagen* and *BFS 2011:6 BBR Boverkets byggregler,* as a point of departure.

17.6.5 Discussion on and proposal for a handbook

When interviewing the municipal officials in Phase 1 about how building permits for culturally and historically interesting buildings were handled, they all answered that there were too many laws and regulations to attend to, they did not have the expertise to assess the consequences of the alterations properly and they did not know where to find the proper information.

A suggestion was put forward at Workshop V regarding the handbooks that are published as a help and guidance for interpreting *BBR, Boverkets byggregler, BFS 2011:6*. Examples are Elmroth's handbook *Energihushållning och värmeisolering, Byggvägledning 8, En handbook i anslutning till Boverkets byggregler*; Orestål's handbook No. 7 on ventilation; and Örnhall's Handbook No. 1, guidance on design and security. The handbooks are general recommendations and advice on how to meet the requirements in *BBR* in practice. The suggestion was to complement this series of handbooks with a new handbook in which the special conditions that exist when working with older buildings that have cultural historic values are described and advice given. The danger of losing cultural historic values in alterations of existing buildings would be considered a little less serious if there was a handbook with guidance for the management of these buildings and their special conditions in the series connected to *BBR*. A handbook for guidance would also be one way to meet the need for an increased knowledge base on energy efficiency measures in built heritage within Swedish County Administration Boards and in the Church of Sweden reported by

Riksantikvarieämbetet and mentioned above. The conclusion is that this could be a valuable help in practice, for practice.

17.7 Main conclusions from Phase 2 in brief

The main results and conclusions can briefly be described as follows. The first research question has been answered: the combination of preservation and energy efficiency actions can be performed in a way that both conservation officers and energy counsellors can accept. The nine workshops revealed a desire for collaboration among different professions. This thesis gives suggestions for how to work with the new combined field of energy performance, cultural historic values and architectural qualities in the existing built environment. The results are a working model with supporting methods based on the pragmatic knowledge and skills of practicing professionals, which guarantees that it will work despite somewhat contradictory legislation. It has been developed for use in the initial stages of the design on preservation projects.

As concluded in Phase 1, the different perspectives could converge, meet and be balanced, but the legal requirements cannot. The conclusion is that the requirement is difficult to meet, but that it would be possible to meet and even exceed the overall target of reducing CO_2 emissions by 20 %. The regulatory requirements should acknowledge and reward the use of renewable energy sources, but this issue can only be dealt with and decided on by elected official at the national level. There is a general imbalance in the regulatory framework: it prioritises energy issues at the expense of cultural values. One conclusion is that a review of the regulatory framework to ensure balancing of interests is needed, but this too is a matter for our national legislative branch.

The work, of establishing educational programmes and centres in the new combined field has been accomplished, but we still have to increase the knowledge base and disseminate that information to the municipal and regional officials, among others, who need it. Two related conclusions are the need for a Swedish guide for assessing architectural values that correspond to the ones available for heritage values and energy audits, and the need for a handbook with guidance on how to meet the requirements of the Swedish National Board of Housing, Building and Planning´s decree with mandatory provisions *BBR, Boverkets byggregler, BFS 2011:6.*

One conclusion is that the combined inventories of energy performance, cultural historical values and architectural qualities, of which the first protocol in the working model is an example, would be of great help for buyers of properties and buildings. It would give them a better overview of a building´s status and possibilities than a single energy declarations can. It would also make a contribution to reducing the stated lack of inventories of our built heritage.

A major conclusion is that the working model and methods provide, and work as, a *trading zone*, which is defined as an active arena for negotiations and a field of knowledge production that brings together a variety of actors´skills, values, facts, expertise and resources. The designed model facilitates reflection in the valuation situation, letting the building itself and the professionals' knowledge and skills guide the choice of measures, and allowing them to set aside prevailing hierarchy of interpretation and make responsible decisions without prestige and on equal terms.

The working model presented here is quite simple in its structure and easy to understand. The supporting methods are grounded in sociological and philosophical stances that are described in international literature available in various languages. The common working process does not vary considerably from one country to another, and the model and supporting methods could be used in early stages of all kind of building processes, and therefore could be of use in countries other than Sweden.

17.8 Continuation

The working model presented here has been developed within the frame of the national programme *Spara och bevara*, Save and preserve, where another project, *Potential and policies for energy efficiency in Swedish historic buildings* presented at workshop V, has addressed the same issue but from another angle. All the different projects in *Spara och bevara* have complemented each other and together the finished and ongoing projects form quite a large knowledge base on a wide range of subjects connected to the new combined field of energy efficiency and preservation in buildings of cultural historic interest. A good base has been created for further research. The possible realisation of the books proposed above, a guide and a handbook, would also be of great help in practice.

A continuation of the EEPOCH project in Phase 3 would be the natural continuation and for streamlining the working model and working methods. The first step would be to select and summarise the practical parts of the thesis and translate into Swedish. An object or two with cultural historic values and where preservation or alteration work is planned could be chosen from the ones earlier restored within the Halland Model. A top-down inventory of them is on-going to supplement the initial bottom-up inventory and assessment of only a few objects performed and accounted for in the licentiate thesis in Phase 1. It is a practical use of the initial protocol created for the working model. When using the protocol on objects heated to +18°C or more on an annual basis, it is possible to discern a common pattern from general data such as A_{temp} and its relation to kWh/year, type of measures and preserved cultural and historic values, and the generalisation is used for a comparison between the objects. The hypothesis is that patterns discerned in Phase 1 will also appear in the top-down inventory. The work will also contain a list of the measures used. The inventory will be described and analysed in a separate report in Swedish.

Tables

Table of figures

Table of photos

Photo 6.7 by Eva Gustafsson, Heritage Halland at the Regional Museum Halland. Tyreshill's façade, towards Southeast.

Photo 6.8 by Heidi Norrström. The Southwest façade of Tyreshill seen from the upper level of the garden.

Photo 9.1 by Heidi Norrström showing a building with added insulation of façades.

Photo 15.1 The photo from the inventory 2006-05-18 by Björn Ahnlund shows the garden side.

Photo 15.2 Spenshult_1-8_A3 by Norrström.

Photo 15.3 Spenshult_1-8_A1 by Norrström.

Photo 15.4 Spenshult_1-8_A2 by Norrström.

Photo 15.5 Spenshult_1-8_A4 by Norrström.

Equations

Equations no. 5.1 and 5.2 show the two steps in a traditional λ-value calculation for transmission losses through envelopes.

Equation no. 5.3 is used for calculation of moisture and condensation at the dew-point in solid constructions indicating if there are risks for condensation and mould growth at thermal bridges. The equation is derived from the software WÜFI.

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Interviews

About the Halland Model in general: Phase 1 and 2

Björn Ahnlund, conservation officer, Charlotte Skeppstedt, conservation officer and Christer Gustafsson, conservation officer. All work at Heritage Halland. Roy Gowers, owner of a restored object.

About the management within the Halland Model: Phase 1

Bo Ek, engineer, CA Consult, Lars Harrysson, engineer, own business, Håkan Larne, architect, own business, Christer Gustafsson, conservation officer, Heritage Halland.

About the demand on cautiousness in existing buildings, and the law, regulation, mandatory provisions and general recommendations: Phase 1

Otto Ryding, Boverket, Charlotta Hansson, municipality of Laholm, Karl-Henrik Widén, municipality of Halmstad, Agne Benjaminsson, municipality of Halmstad, Monica Rudquist, municipality of Falkenberg, Pontus Swahn, municipality of Hylte.

About systemic thinking: Phase 2

Hans Sarv, organisational consultant, Karin Korpelainen, psychologist/psychotherapist, Eva Wetterdal, organisational consultant.

Interview protocols

Questions for the meetings with Hans Sarv, Stockholm, 10 and 12 April 2013

Introduction – description of the work

My work within the EEPOCH project includes finding effective collaborative methods and approaches for the professions involved in the new combined field of energy efficiency and conservation of cultural historic built environment. The main criteria are found to be a democratic and transparent organisation where individuals can act autonomously on an equal level. The idea is that a systemic organisation and use of systemic meetings could be one of the methods that are appropriate for use as a routine for continuous reconciliation for maintaining a good working climate (QA, quality assurance), when there is a need to clarify a problem/solution and its consequences, and when there are diverging opinions with equally strong arguments for a certain solution/measure.

This is an understanding on the basis of having read the book ”Tänk om” where you have written the two final chapters, and Ainalem, Lindström and Garsén are the editors.

My first question is if systemic meetings could be used in all these three different ways? A follow-up question depending on your answer will be if you're willing to lead a systemic meeting in the EEPOCH project or if you know someone who could do that? The *other questions* that have been on my mind, and which I would like to discuss if there will be time for it, belong to the four categories I call *A-D below*.

A Concepts; systems – systemic

Where do you place the systemic thinking in relation to systems thinking?

B Literature

Is there any literature you can recommend for a theoretical stance and/or background to systemic thinking?

Do you know anyone else who has written specifically about systemic meetings?

C Your background, approach, preference

Where is your basis within theory and practice?

What is the biggest advantage of systemic thinking in your opinion?

D Orientation, use, example

What is your focus?

─ collaboration within organisations

─ leadership and management of organisations

─ both options above

─ something else

How and when do you use the systemic thinking other than as described in your book, and can you say anything about the usual or common use?

Can you give some examples of how you use it in your work?

Can you give some examples of how others use it or do you know someone that I could contact?

Are there any educations in systemic meetings? Where can one find them and what prior knowledge is required to join such training?

Questions for the meeting with Karin Korpelainen, Gothenburg, 26 March 2014

Introduction – description of the work

My work within the EEPOCH project includes finding effective collaborative methods and approaches for the professions involved in the new combined field of energy efficiency and conservation of cultural historic built environment. The main criteria are found to be a democratic and transparent organisation where individuals can act autonomously on an equal level. The idea is that a systemic organisation and use of systemic meetings could be one of the methods that are appropriate for use as a routine for continuous reconciliation for maintaining a good working climate (QA, quality assurance), when there is a need to clarify a problem/solution and its consequences, and when there are diverging opinions with equally strong arguments for a certain solution/measure.

My first question is if you know of systemic thinking and if you are using it? As a second question I wonder if you know someone who uses it whom I could contact and speak further with.

The *other questions* that has been on my mind, and which I would like to discuss if there will be time for it, belong to the four categories I call *A-D below*.

A Literature

Systemic meetings as described in;

Ainalem, I., Lindström, B., Garsén, J. (2013) *Tänk om*, 1st ed, Lund: Studentlitteratur AB.

Do you know it?

Do you know of or have you used this special method for meetings?

B Concepts; systems – systemic

Where do you place the systemic thinking in relation to systems thinking?

Supplementary questions below are only asked if they are relevant in this instance.

C Your background, approach, preference

Where is your basis within theory and practice?

What is the biggest advantage of systemic thinking in your opinion?

D Orientation, use, example

What is your focus?

How and when do you use the systemic thinking and what is the usual or common use?

Can you give some examples of how you use it in your work?

Can you give some examples of how others use it or do you know someone that I could contact?

Questions for the meeting with Eva Wetterdal, Malmö, 25 June 2014

Introduction – description of the work

My work within the EEPOCH project includes finding effective collaborative methods and approaches for the professions involved in the new combined field of energy efficiency and conservation of cultural historic built environment. The main criteria are found to be a democratic and transparent organisation where individuals can act autonomously on an equal level. The idea is that a systemic organisation and use of systemic meetings could be one of the methods that are appropriate for use as a routine for continuous reconciliation for maintaining a good working climate (QA, quality assurance), when there is a need to clarify a problem/solution and its consequences, and when there are diverging opinions with equally strong arguments for a certain solution/measure.

My first question is if systemic meetings could be used in all these three different ways? The *other questions* that has been on my mind, and which I would like to discuss if there will is time for it, belong to the four categories I call *A-D below*.

A Literature

Systemic meetings as described in;

Ainalem, I., Lindström, B., Garsén, J. (2013) *Tänk om*, 1st ed, Lund: Studentlitteratur AB.

Do you know it? Do you know of or have you used this special method for meetings?

The systemic thinking as described in;

Tubert-Oklander J. and Hernández de Tubert R. (2004) *Operative Groups. The Latin-American approach to group analysis*. London: Jessica Kingsley Publishers Ltd.

Do you know it? Do you know of or have used the method for analysis?

About the book you recommended;

Hornstrup C.,Loehr-Petersen J., Gjengedal Madsen J., Johansen T. and Vinther Jensen A. (2012) Systemiskt ledarskap och organisationsutveckling. Lund: Studentlitteratur.

What parts of the book do you use and what parts of the book do you think are the most important to take note of?

B Concepts; systems – systemic

Where do you place the systemic thinking in relation to systems thinking?

C Your background, approach, preference

Where is your basis within theory and practice?

What is the biggest advantage of systemic thinking in your opinion?

D Orientation, use, example

What is your focus?

─ collaboration within organisations

─ leadership and management of organisations

─ both options above

─ something else

How and when do you use the systemic thinking and what is the usual or common use?

Can you give some examples of how you use it in your work?

Can you give some examples of how others use it – you mentioned Ramböll in your e-mail ─ or do you know someone that I could contact e.g. at Ramböll?