



changes

Changes in Cultural Heritage Activities: New Goals and Benefits for Economy and Society

www.changes-project.eu

changes

Changes in Cultural Heritage Activities: New Goals and Benefits for Economy and Society

CHANGES is a European Project supported by the JPI Heritage Plus program.

Considering the diversity of European cultural heritage, the skills required in built heritage activities and the spread of environmentally sustainable approaches, the research aims at

**producing new local models directed to support
Planned Preventive Conservation, Maintenance and Monitoring.**

The **main topics** are:

- conservation and valorisation as preventive measures;
- effectiveness of maintenance, involving relevant craftsmanship and expertise;
- economic mechanisms underlying built heritage conservation in the context of regional economy and the wider construction sector;
- impact of knowledge gain and its dissemination on smart economy for built heritage conservation, heritage management and construction sector.

The **expected outcomes**, to be transferred to stakeholders and society, in order to increase social and human capital at a local level are:

- a better understanding of cultural heritage;
- an empowerment of local communities;
- a progress of protection quality of built heritage;
- environmental enhancement;
- an improved cost-effectiveness for private owners and managers of historic properties;
- a proposal for a funding scheme supporting a sustainable conservation process.

changes

Changes in Cultural Heritage Activities: New Goals and Benefits for Economy and Society

Partners:

- **Politecnico di Milano**, ABC Department
- **Katholieke Universiteit Leuven**, MAT Division
- **Uppsala University**
- **Delft University of Technology**, Heritage & Architecture Section
- **Foppoli Moretta e Associati**



**POLITECNICO
MILANO 1863**
DIPARTIMENTO DI ARCHITETTURA,
INGEGNERIA DELLE COSTRUZIONI
E AMBIENTE COSTRUITO



Associate Partners:

- Monumentenwacht Noord-Brabant
- Monumentenwacht Flanders
- Consorzio Villa Reale e Parco di Monza
- Navarra Gestioni
- Assimpredil ANCE, Association of Building and Related Companies of Milano, Lodi, Monza e Brianza provinces



Work Packages:

1. Project Management.
2. Conceptualization of previous experiences: **MonumentenWacht** in Belgium and in the Netherlands, **Halland Model** in Sweden, **Distretti Culturali** in Italy.
3. Implementation of maintenance systems: investigation on efficacy of maintenance practices in Belgium.
4. Implementation of maintenance systems: investigation on efficacy of maintenance practices in The Netherlands.
5. Implementation of maintenance systems: investigation on efficacy of maintenance practices in Italy.
6. Economic analysis of costs and benefits of preventive conservation practices (monitoring and maintenance systems).
7. Analysis of economic and societal impacts and externalities of valorisation strategies including conservation activities.
8. Dissemination and transfer.

WP3**IMPLEMENTATION OF MAINTENANCE SYSTEMS:
INVESTIGATION ON EFFICACY OF MAINTENANCE PRACTICES IN BELGIUM****Responsible**

Principal Investigator 2: Prof. Koen Van Balen, KU Leuven, Building Materials and Building Technology Division.

Partners involved

- **Principal Investigator 2:** Prof. Koen Van Balen, KU Leuven, Building Materials and Building Technology Division.
- **Associate partner:** Monumentenwacht Flanders.

Methodology adopted

Action Research.

Timing

November 2015 – October 2017

Abstract

KU Leuven collaborated with Monumentenwacht Flanders to study maintenance problems of historic buildings (listed and non-listed), to understand monitoring/reporting, to understand types of interventions in the past, to evaluate those interventions in terms of effectiveness, durability (service life) and cost and to understand the skills and knowledge involved in this process. One urban environment (Mechelen) and a rural area (South-East of Limburg) were studied to include the impact of the location context, urban or rural, on the maintenance guidelines which were formulated in the reports and on the types of interventions which were effectively carried out. Case studies were selected firstly, based on their ownership and secondly, based on whether or not the recommended interventions were indeed implemented.

Within this work package, the analysis focused firstly on the technical quality of the undertaken interventions or, in case no interventions were carried out, the effects of absence of maintenance and postponing of interventions.

Following methodologies and reference systems were applied:

- Reports from Monumentenwacht Flanders, which indicate the physical state of the monument from periodic (visual) inspections and recommended interventions. These reports thus implicitly contain information on maintenance and management.
- Interviews were carried out, targeting owners/occupiers and stakeholders (local authorities, architects, contractors, craftsmen) to obtain input on collaboration schemes, awareness, social benefits and boundary conditions.

Link to other WPs

Gathered information were processed both in WP6 and WP7.

TABLE OF CONTENTS

OBJECTIVES AND METHODOLOGY	p. 6
MAINTENANCE APPROACHES FOR BUILT HERITAGE: STATE OF THE ART	p. 7
THE OWNERS' MAINTENANCE OBJECTIVES	p. 8
Appreciation of the property	p. 8
Perception on maintenance	p. 8
THE OWNERS' MAINTENANCE APPROACHES	p. 10
Monitoring the state of preservation	p. 10
Planning of maintenance activities	p. 11
Execution of maintenance activities	p. 11
Frequency of maintenance activities (gutters, painting windows)	p. 12
QUALITY OF THE INTERVENTIONS	p. 14
Case UE-PR-01: lack of maintenance -> loss of materials	p. 14
Case UE-PR-02: good intents, but bad execution	p. 15
Case UE-PR-05: durability of materials	p. 15
SKILLS AND KNOWLEDGE INVOLVED	p. 18
CONCLUSIONS	p. 19
REFERENCES	p. 20

OBJECTIVES AND METHODOLOGY

KU Leuven collaborated with Monumentenwacht Flanders to study maintenance problems of historic buildings (listed and non-listed), to understand monitoring/reporting, to understand types of interventions in the past, to evaluate those interventions in terms of effectiveness, durability (service life) and cost, and to understand the skills and knowledge involved in this process. One urban environment (Mechelen) and a rural area (South-East of Limburg) are studied to include the impact of the location context, urban or rural, on the maintenance guidelines which are formulated in the reports and on the types of interventions which were effectively carried out.

Case studies were selected firstly, based on their ownership (public vs private ownership) and secondly, based on whether or not the recommended interventions were indeed implemented. The latter was established in a preliminary interview with the local heritage agency. For the urban environment, eleven cases were selected of which seven have private ownership, two are churches and two are owned by the local government. For the rural area, eight cases were selected of which six have private ownership, one is a church and one is owned by the local government. Thus resulting in nineteen case studies. An overview of the case studies and their main characteristics is given in annex.

The final report of WP3 consists of five sections. Section 3.1 gives a state of the art on maintenance practices. The state of the art departs from the added value of preventive conservation practices and identifies how maintenance practices should ideally be conducted within this framework. Section 3.2 reports on the identified maintenance objectives of the owners, which were identified based on in-depth interviews with the owners. Section 3.3 describes the approach of the owners and thus reports on the monitoring/reporting and the types of executed interventions. These results are based on in-depth interviews, the analysis of the reports of Monumentenwacht and the documentation found on the undertaken interventions. The evaluation of the effectiveness and durability of the interventions is discussed in section 3.4 and the identification of skills and knowledge can be found in section 3.5.

In this section of the report, the investigated case studies are referred to with a coding system that consists of three components. The first component indicates the location within the two regions: urban environment (UE) or rural area (RA). The second component indicates the difference in ownership: private ownership (PR), churches (CH), local government (LG). The final components gives a number to distinguish the cases. So for example case UE-PR-01 is the first privately owned case in the urban environment.

MAINTENANCE APPROACHES FOR BUILT HERITAGE: STATE OF THE ART

Within the framework of preventive conservation approaches, literature emphasises that maintenance approaches for built heritage should entail a combination of monitoring, planning and technical actions, that are part of a well-defined plan (Dann, Worthing et al., 1999; Forster and Kayan, 2009; Vandesande, 2017). The main aim is the preservation of cultural significance. Other aims of maintenance activities for historic buildings that were identified in the literature are the preservation of historic fabric, the preservation of the building's use or function, long term cost saving, minimization of uncertainties, community involvement, capacity building, and social benefits related to local sustainable development (Feilden and Jokilehto, 1998; Icomos, 1999; Dann and Wood, 2004; Dann and Cantell, 2005; Dann and Worthing, 2005; Forster and Kayan, 2009; Dann, 2013; Della Torre, 2013; Moioli, 2013; Van Balen and Vandesande, 2013; Van Balen, 2015).

All interventions should be minimal technical interventions, that follow a four step approach: anamnesis, diagnosis, therapy, controls (Icomos, 2003; Vandesande, 2017). The first step, the anamnesis, aims at gathering information on the building, its components, its materials, and its environment. The aim of the diagnosis is to understand detected damages and identify their causes (Van Balen, 1988). The therapy should be based on the diagnosis and should aim at treating the causes, rather than the symptoms. Interventions should respect conservation principles, which implies that interventions should respect the principle of minimal intervention – doing as little as possible and as much as necessary – as well as the principles of reversibility or compatibility and retreatability (Icomos, 2003). The aim of the controls is to evaluate the interventions, to perform a quality check during execution, to predict the future behaviour and to check the behaviour through long term monitoring (Van Balen, 1988). Therefore, interventions should be accompanied by controls during the works, and monitoring should be carried out after the works to ascertain their efficacy (Verstrynge, Schueremans et al. 2012). Monitoring activities before, during and after the works should be documented (Icomos, 2003). In the Flanders context, the anamnesis and the controls are integrated in the Monumentenwacht model.

Vandesande refers to the importance of knowledge within preventive conservation practice. This includes knowledge on performances, materials, techniques and damage processes, as well as know-how on the application of interventions in practice and workmanship (Vandesande, 2017). For the same reasons, Marconi referred to the “art and culture of maintenance of historic buildings” in his works during the 1980s. He describes a practice of maintenance activities that tends to get lost in the final epochs of the 20th Century due to the belief in miracle products and solutions that can protect the building's outer shell from the influences of its environment (Marconi, 1984).

It can be concluded that for built heritage, maintenance activities should be integrated in a well-defined approach and aim at the preservation of cultural significance. The applied approach should entail regular monitoring and small interventions that follow a four step approach: anamnesis, diagnosis, therapy, controls. Knowledge exchange, documentation, knowledge enhancement and capacity building are essential aspects within the framework of maintenance activities on historic buildings.

THE OWNERS' MAINTENANCE OBJECTIVES

In order to understand the aim of the owners' maintenance approaches, 13 private and 6 public owners were questioned during in-depth interviews concerning their appreciation of the property, as well as their perception on maintenance. The obtained data was analysed based on Grounded Theory, a research methodology of social sciences. The method starts from the idea that the researcher develops theory based on empirical material. Furthermore, Grounded Theory expresses the importance of a cyclic work approach in the analysis of data. This analysis strategy enables open data retrieval, and a gradual building up of a validated hypothesis. After interviewing the seven private owners, transcribed interviews were therefore analysed through a three step coding method. A first step is open coding, an analytical process to identify concepts. A second step is axial coding, a process of linking the identified concepts into categories and subcategories. A third step is selective coding, wherein the concepts are integrated into a final hypothesis (Glaser and Strauss, 1967; Mortelmans, 2013).

The in-depth interviews with the owners reveal their attitudes regarding the appreciation they have for their historic buildings and on their understanding of what is understood under the term "maintenance".

Appreciation of the property

Most of the private owners refer to the property's architectural values. This was the cases for 7/7 private owners in the urban environment and 5/6 private owners in the rural area. They mostly refer to the organization of spaces, the use value, but also to specific architectural elements such as wooden floors, chimneys, stucco ceilings etc. The private owners in the rural area also relate strongly to the local character of their properties, which is sometimes related to the applied materials, such as the local marlstone, but also related to the typology and spatial distribution of the dwellings.

The public owners of the cases in the urban environment discuss the architecture and its historic relevance. The public owners of the cases in the rural area focused more on the identity of the properties for the local community.

In total 11/13 of the private owners consider their property also as their "home". Only two owners in the urban environment rent out the property. This contributes to personal bond with the property on the one hand, but on the other hand also a need to address the importance of the property's "use" value. Furthermore, 5/13 of the private properties were family inheritances: one in the urban environment and four in the rural environment. When the property is a family inheritance, it adds to the personal bond and many of those owners indicated not to be able to let go of the property. About 6/13 private owners did a large initial investment after purchasing the property. It mostly entailed a restoration project of a property that had been abandoned for many years. Furthermore 2 properties in the rural area are in a poor state of preservation and the owners are working on a restoration project. Whilst the owners in the urban environment did not mention the financial burden of maintenance activities, the owners in the rural area addressed this issue numerous times. Many of the owners have difficulties in finding the necessary resources for the restoration and maintenance of their properties and they feel left alone in their situation. All the public owners indicated the responsibility they have towards their community in maintaining their properties and handing it over to the next generation. The church buildings furthermore have a religious function, which can be compared to the "use" value of the dwellings, since it sometimes creates tension when its aims do not coincide with those of the artistic value of the property.

Perception on maintenance

All owners indicate that the aim of maintenance is to safeguard the state of preservation of the building. The incentive for maintenance works is to keep the (financial) value of the ownership or to reduce financial spending later. This is the case for:

1. Private owners who did a large or small initial investment in the property and want to preserve this investment (valid for all private properties).
2. Public owners who went through long restoration procedures and want to avoid new restoration projects (valid for churches).
3. Owners (UE-PR-02, UE-PR-05, UE-PR-06, UE-PR-07, UE-CH-01, UE-CH-02, UE-LG-01, UE-LG-02, RA-PR-01, RA-PR-02, RA-PR-03, RA-PR-04, RA-PR-05, RA-PR-06, RA-CH-01, RA-LG-01) who argue that maintenance aims at avoiding costs in the future.
4. Owners (UE-PR-01, UE-PR-02, UE-PR-03, UE-PR-06, UE-PR-07, UE-CH-01, UE-CH-02, UE-LG-01, UE-LG-02, RA-PR-01, RA-PR-02, RA-PR-03, RA-PR-04, RA-PR-05, RA-PR-06, RA-CH-01, RA-LG-01) who argue that maintenance is cost-effective.

For three private owners (3/13) and all public owners, the maintenance activities contribute to the preservation of historic fabric. The public owners furthermore refer to their responsibility towards the community to maintain the properties in a good state.

When asked about what types of interventions are to be considered “maintenance”, the owners responses can be summarised as follows:

1. “Small repairs”: repositioning loosened elements, repair of leakages (total 16/19, private 9/13).
2. “Cleaning gutters” (total 12/19, private 5/13).
3. “Painting of windows” (total 14/19, private 7/13).
4. “Check-ups”: cracks, pressure of water tubes central heating, positioning of roof tiles after storm (total 7/19, private 3/13).
5. “Cleaning” (total 5/19, private 2/13).
6. “Use of the building”: heating, airing (total 2/19, private 2/13).
7. “Renovation and restoration”: renewal electricity, new windows, new roofing, repointing, restoration of wooden floors (total 6/19, private 4/13).

When asked about how they define “good maintenance”, the owners responses can be summarised as follows:

1. “Qualitative interventions” (total 11/19, private 7/13).
2. “Objective = preservation of the building’s state” (total 15/19, private 9/13).
3. “Good maintenance is preventive (timely)” (total 9/19, private 5/13).
4. “Regular inspections (Monumentenwacht or own inspections)” (total 4/19, private 3/13).
5. “Preventing replacement of historic fabric, due to authenticity” (total 4/19, private 2/13).
6. “Administrated with due diligence” (total 7/19, private 2/13).
7. “Respecting the character of the historic property” (total 4/19, private 3/13).
8. “The motivation to do the right thing” (total 1/19, private 1/13).
9. “Prioritizing correctly” (total 1/19, private 1/13).
10. “Being able to have confidence in the contractor” (total 2/19, private 1/13).

THE OWNERS' MAINTENANCE APPROACHES

The owners approach can be analysed understanding their attitude towards monitoring, the planning and execution of maintenance activities, and the frequency of maintenance activities.

To analyse the owners' maintenance approaches, a first insight is gained into the frequency of the inspections through the reports of Monumentenwacht. Only two case studies have so far not been inspected by MoWa. The frequency of inspections is calculated based on the time interval between the first inspection (by the current owner) and the year of investigation (2017), and the number of inspection reports done in that period of time.

Case	Years of inspections	Time interval (first report – 2017)	Number of inspections	Frequency
UE-PR-01	2013	4	1	0.25
UE-PR-02	1999, 2004, 2011, 2015	18	4	0.22
UE-PR-03	(1995, 1997), 2006	11	1	0.09
UE-PR-04	1999, 2002	18	2	0.11
UE-PR-05	2001, 2004, 2007, 2009, 2011, 2015	16	6	0.37
UE-PR-06	1995, 1998, 1999, 2002, 2005, 2014	22	6	0.27
UE-PR-07	1996, 1998, 2000, 2002, 2005, 2007, 2010, 2014	21	8	0.38
UE-CH-01	1993, 1995, 1998, 2004, 2009, 2014	24	6	0.25
UE-CH-02	1996, 1999, 2003, 2006, 2010, 2014	21	6	0.29
UE-LG-01	1997, 2000, 2007	20	3	0.18
UE-LG-02	1997, 2000, 2005, 2010	20	4	0.20
RA-PR-01	2017	0	1	
RA-PR-02	2017	0	1	
RA-PR-03	/	/	0	
RA-PR-04	2016	1	1	
RA-PR-05	/	/	0	
RA-PR-06	(2001)		(1)	
RA-CH-01	2017	0	1	
RA-LG-01	2014	3	1	

Monitoring the state of preservation

Eight owners in the urban environment (UE-PR-01, UE-PR-02, UE-PR-05, UE-PR-06, UE-PR-07, UE-CH-01, UE-CH-02, UE-LG-02) have a frequency that is higher than once every five years. Five of them are private owners, two of them are churches and one is a local government building. Two private owners (UE-PR-05, UE-PR-07) have a frequency that is higher than once every three years, which is considered a good inspection rate for early detection of damages.

Three of the six private owners in the rural area became only recently a member of Monumentenwacht, thanks to an initiative by the local government to promote and financially support their memberships. From their recent experience they appreciate the expertise and thoroughness of MoWa and they use the recommendations for understanding the severity of occurring damages. The other three private owners in the rural area were not yet aware of the practices of Monumentenwacht. Furthermore, two of those properties are in a poor state of preservation and in need of a restoration. The poor state is related to a lack of financial resources and support for undertaking the restoration project.

Planning of maintenance activities

9/13 private owners have a well-defined approach. 2/13 private owners have properties in a bad state of preservation.

4/13 private owners rely on MoWa, which means they contact MoWa for regular inspections and contact a contractor after selecting a number of recommendations they want to act upon. Additionally, five private owners (UE-PR-01, RA-PR-01, RA-PR-02, RA-PR-03, RA-PR-04) want to follow this approach. The owner of UE-PR-01 is currently restoring his property and plans to rely on MoWa for the maintenance activities after concluding the restoration. The four owners of RA-PR-02 and RA-PR-04 only recently became members of MoWa and the owners of RA-PR-03 expressed their interest in becoming a member during the interview.

One private owner (UE-PR-03) does not rely on inspections by MoWa, but performs inspections on his own. Over the years, they developed an own maintenance calendar for the house, including regular actions and small interventions such as check-ups and cleaning. Larger interventions, such as painting of timber joinery, are done by the owners during a two weeks maintenance period in the summer. The owners rely on MoWa for inspections when they feel they lack the expertise. They are now considering for example to ask MoWa to inspect the roof structure, since they plan a larger repair intervention for this part of the building and value an objective opinion on the state and works that need to be done. They also did one inspection in 2006 while they were restoring the property. Furthermore, two inspections were done in 1995 and 1997 by the parents of the current owners.

The owners of UE-CH-01 rely on MoWa, but indicate it is not always possible to execute all the recommendations due to a limit budget. When works are indicated to be urgent, such as infiltrations, then they will try to resolve them as soon as possible in order to avoid further damages. During the 1990s, the church had many leakages in the roof coverings. Those were restored in a restoration in 2000-2001, and now the gutters are inspected and cleaned every year by a local contractor.

For UE-CH-02, the owner indicates that for now most maintenance works are curative, responding to the recommendations made by Monumentenwacht. There are a number of restoration projects ongoing or planned in the near future. After their completion, the owner plans to make a 20 years maintenance plan for the church, which should focus more on preventive maintenance activities, rather than after-damage repairs. The owners of UE-LG-01 and UE-LG-02 rely on MoWa, but not during the first years after the completion of a restoration project. The owners also carry out inspections on their own. Most works that are done now are curative, ad-hoc interventions. The owner hopes to evolve towards a more regular and preventive approach with the use of contracts with contractors.

The owners of RA-CH-01 rely on MoWa. All proposed urgent works are dealt with, and they also make their own priorities based on the report. Furthermore, the owners of RA-CH-01 indicate they will also execute the proposed works when they are easy to perform.

The owners of RA-LG-01 ask Monumentenwacht for yearly inspections. They also have a contract with a contractor who checks the roofs every two years and does maintenance repairs. They have a check-list with regular works for yearly maintenance, which they discuss at regular basis. They are in the process of preparing a 20 years maintenance plan for the building.

Execution of maintenance activities

7/13 private owners indicate they have difficulties in finding a good contractor to execute works. 2/13 private owners find contractors through a local architect with experience in conservation of historic buildings. 10/13 private owners indicate they find contractors through their personal network. 4/13 private owners (in the rural area) indicate they ask around in the neighbourhood and when contractors are performing works, they ask their neighbours about their experiences.

For some owners, it is difficult to find contractors who are specialized in specific works (UE-PR-02, UE-PR-03, UE-PR-04, RA-PR-02, RA-PR-03, RA-PR-05, RA-PR-06). The owner of case UE-PR-02 also indicated that local contractors are often not specialized and distant contractors do not make the journey for a small repair.

Furthermore, specialized contractors are often occupied on large projects and do not accept small projects (UE-PR-02, UE-PR-04, RA-PR-04). In the rural area, specialized works are more related to the conservation of the local marlstone, and the owners indicate there is one main contractor available who performs these interventions for all the local properties. For some private owners, it is difficult to understand when a contractor is up for the job. It is not always clear when the owners should contact specialized craftsmen. The owner of case UE-PR-03 indicates that the costs of specialized works are high. Owners would like to get more support in understanding how to carry out the works, and they would like to get this information from someone who is objective. Various private owners (UE-PR-02, UE-PR-03, UE-PR-04, RA-PR-05, RA-PR-06) express that there is furthermore a lack of someone who can advise them on the technical aspects and who can guide them in the complexity of the collaboration and coordination of different stakeholders. Private owners in the rural area however also demonstrate that through collaboration with contractors and Monumentenwacht, they have gained also technical insights in conservation practice (RA-PR-01, RA-PR-04). Finally, due to bad experiences (lack of motivation and bad intents), 5/13 private owners have little confidence in the construction practitioners, which includes both architect and contractors. 4/13 private owners (rural area) indicate that they were able to find good local contractors and build a trust relationship with them.

The owners of UE-CH-01 rely on contractors for most interventions due to safety reasons (working on heights) and because they believe in the need for skilled craftsmen for the interventions. For larger interventions, they will contact at least three contractors, according to the public procurement regulations local governments have to apply, and they are assisted by architects of the city of Mechelen. For the yearly cleaning of gutters and check-up of the roof coverings, they contact the contractor who did the restoration works of the roof. They indicate this contractor understands how the roof was constructed and how to safely enter in all parts.

The provincial government indicates that for UE-CH-02 they have no difficulty in finding good contractors, since their offices collaborate with numerous contractors on big and small projects.

The owners of UE-LG-01 and UE-LG-02 always work with contractors, who are chosen based on the regulations for local governments.

The owners of RA-CH-01 do some works, such as the painting of the church with volunteers, for some small works they have a good local contractor and for larger projects they follow the regulations for local governments. They indicate that the local contractor is more involved in the works than the bigger restoration contractors.

The owners of RA-LG-01 indicate they can easily find contractors, which are mostly local contractors, since they consider it important to hire a contractor they can trust.

Frequency of maintenance activities (gutters, painting windows)

Owners were asked how frequently they clean there gutters and paint there timber joinery. Table 1 indicates the frequencies of the cleaning of the gutters, based on the in-depth interviews. The frequency is determined based on the information given by the owners in the in-depth interviews when asked how frequently they perform the interventions: e.g. once every year means $f = 1$, twice every year means $f = 2$, once every two years means $f = 0.5$.

Regarding the painting of the timber joinery, the owners did not have a clear planning. Most owners had difficulties remembering the exact year in which the last painting intervention was done. They either decide to paint based on the reports of MoWa or based on observing themselves whether the paint layers are peeling off.

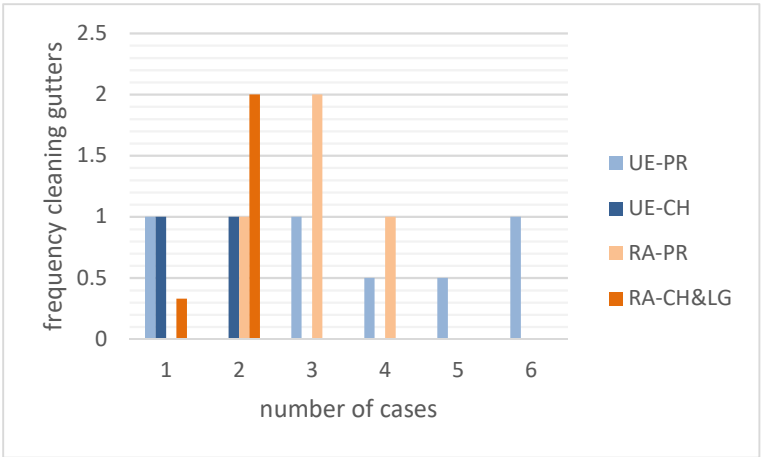


Table 1 – Frequency of maintenance activities (gutters).

QUALITY OF THE INTERVENTIONS

Reporting on the analysis of three case studies helps to understand how in spite of having a good monitoring by MoWa, (maintenance) interventions do not have the expected outcome. The cases refer to the three following challenges:

1. The lack of maintenance leads to renewal resulting in loss of authentic fabric.
2. Good intentions of owners can be jeopardized by the inability to control the quality of executed interventions.
3. The use of less durable materials as a consequence of cutting budgets when the total package of interventions becomes too expensive.

Case UE-PR-01: lack of maintenance -> loss of materials

The lack of maintenance has created a number of problems regarding the preservation of the property. As part of the listing of the property, the Flemish Heritage Agency made a report of the building's condition in 2005. At that point, it was indicated the property was in a good state of preservation. In 2013, shortly after the new owners purchased the property, an inspection was done by Monumentenwacht. The report indicates that there are several leakages which have also jeopardized the stability of the roof structure. Furthermore, fungus attacks were detected in both structural and non-structural elements in timber throughout the building. Therefore, in 2014, funding was requested and obtained for the renewal of the roof structure and the roofing material. Very few elements of the 19th century roof structure were preserved, partly due to its poor state of preservation, but also since the structure was considered less valuable due to a poor assembly (probably the result of several interventions and repair) and poor timber quality of the 19th century softwood. The description of the works however indicates that the roof structure should be repaired and preserved, but it seems that during the course of the works the structure resulted in such a poor state of preservation that renewal was preferred over repair. One can therefore state that the lack of maintenance works resulted in the loss of the 19th century roof structure of this building.



Fig. 1 – Left: roof structure before renewal, 2013 (picture by owner). Right: roof structure after renewal, 2015.

In 2015, funding was requested and obtained for the renewal of the windows and the wooden floors. Most of the existing wooden floors on the ground floor were deteriorated due to fungus attacks. Therefore, those wooden floors were completely renewed and good planks were recovered to restore the floors on the first floor. The windows were also deteriorated due to the lack of maintenance, resulting in the sills to be completely rotten. All windows were therefore replaced. Thus one can also state that the lack of maintenance also resulted in the loss of a large percentage of the wooden floors and of all the 19th century windows.

Case UE-PR-02: good intents, but bad execution

During the in-depth interviews, the owner of case 2 indicated to be concerned for the historical fabric and demonstrated a tendency towards a preventive conservation approach. The average frequency (f) of Monumentenwacht inspections is once every 5.33 years ($f=0.188$).

The good intent of the owner is undone by the inability to control the quality of executed interventions. The roof covering of the flat roof in roofing material, that had already been renewed in 1994, was completely renewed in 1999, based on the recommendations of Monumentenwacht, due to the sloppy placement of the initial covering and the poor execution of connections. After the intervention of 1999, problems were again detected regarding the sloppy placement of the roof covering, resulting in superficial cracks, mechanical damage, folding of the borders, loosening of connections and loosening of seams. In 2011, Monumentenwacht detected leakages, which were repaired in 2012.



Fig. 2 – Infiltrations in roof surface and connections, 2011.

Pictures by MOWAv.

Case UE-PR-05: durability of materials

During the in-depth interviews, the owner of case 5 demonstrated a thorough understanding of the building's historical evolution and significance. The concern for the historical fabric was however strongly related to the building's interiors. This might be related to the intense restoration that the dwelling was subjected to in the period 1985-1986, due to its poor state of preservation after purchasing it a few years before. The intense restoration required a large investment, which led to some cuts in the expenses by applying less expensive but also less durable materials. A shift in the choice of materials was noted after the listing in 2005. Many of those initial choices were rectified over the years, with the aid of government funding. The average frequency (f) of Monumentenwacht inspections is once every 3.5 years ($f=0.286$). The average response time is 10.58 years. About 47% of the detected damages were not yet solved and the average severity of the detected damages is 5.1. A renewal of the roofing material is planned in 2017, so it is expected that most of the pending damages will be resolved in the next inspection report.

The compiling of a chronological sequence for the gutters and the roof covering, enabled to understand more of the owner's maintenance approach. The chronological sequence was reconstructed based on the inspection reports, the project documents and interviews with the owner. The project documents are related to the initial restoration of 1985-1986 and the renewal of the gutters in 2014.

Regarding the gutters, the invoices of the 1985-1986 restoration project indicate that initially it was foreseen to line the timber gutters with zinc. On the 6th of December 1985, the contractor proposed a reduced price for realizing the lining of the gutter bottoms in asphalt, while the elevations are lined with zinc, that is nailed to the gutter's timber frame. The initial inspection report of Monumentenwacht dates back to 2001, so 15 years after the execution. The report indicates that the applied materials are less durable and refers to a number of problems with the execution. Firstly, the lining of the gutter bottoms in asphalt tends to fold up, a

problem that already caused leakages of which some had been repaired in the past. The report of 2001 mentions previous repairs of leakages. Secondly, the lining of the elevations in zinc demonstrated problems of loosening of the soldered seams, which again caused infiltrations. Furthermore, there is a technical design issue that aggravates the situation: some of the downpipes were eliminated during the restoration works of 1985-1986, which resulted in a reduced slope of the gutter towards different exits. Water was therefore less efficiently drained and rainwater would stand in the gutter. The combined issues led to decay of the gutter's timber structure, which in 2005 is mentioned to have caused a subsiding of the gutter structure, again resulting in more standing water in the gutters. Some of the problems were temporary repaired with often non-durable techniques and materials. For example, the leakages of the gutter bottoms in asphalt were repaired by gluing lead flashings onto the asphalt, but the glue would loosen, leading again to leakages. Those leakages were then again repaired with more gluing. This temporary repairs continue until the replacement of all the gutters with new zinc linings in 2014.



Fig. 3 – Left: gutters in asphalt, 2011. Right: new gutters with zinc linings, 2015.
Pictures by MOWAv.

Regarding the roof covering in ceramic tiles, there were four design issues regarding its initial placement in 1986: (1) a sloppy placement of the ceramic tiles, (2) the use of different tile sizes, (3) the lack of a double tiling batten to support the lower row of tiles, (4) the durability of the applied materials. The first two issues were only mentioned for the first time by Monumentenwacht in 2011, when it was clear that the sloppy placement lead to a bad connection between the tiles and the shifting of the tiles. Some of the shifted tiles were repositioned using building foam or they were repaired with adhesive tape. The lack of the double tiling batten led to the shifting of the lower row of tiles and the uncovering of the ends of the pan laths and the roof sheathing, which accelerated their deterioration. Strangely this design issues was not resolved during the placement of new gutters in 2014. Finally, the durability of the applied materials, is related to the reuse of existing tiles for the restoration of 1986. It was common practice at that time to use recycled old tiles from other buildings for restoration projects, to give the roof coverings an authentic character. Already in 2014, only 28 years after the placement of the tiles, the reports of Monumentenwacht indicate the first signs of deterioration of the roof tiles. The initial superficial deteriorations increase the tiles' porosity, which leads to a higher rate of water absorption and increases the chance of mechanical damage due to frost. Another issue regarding durability of applied materials is the use of cement based mortars for connections of ridges and raised gables, which leads to deterioration of the hard mortars and local infiltrations. The roof coverings are planned to be replaced with government funding in 2017, only 30 years after their initial placement.



Fig. 4 – Left: uncovering of roof sheathing and pan laths due to shifting of tiles, 2015.
Right: deterioration at connection raised gable due to incompatible cement based mortar, 2015.
Pictures by MOWAv.

This case demonstrated how design choices lead to a reduced life time for the elements of the rainwater disposal system. The detected issues were furthermore repaired temporarily with less durable methods and materials, awaiting a renewal of the entire component with more durable materials. The main question is if after the renewal the owners will also apply more durable repair methods. Based on the interviews with the owner of case 5, it was clear that the methods of repair are not decided by the owner, but by the contractor. The owner directly takes the report of Monumentenwacht to the contractor who solves the issues.

SKILLS AND KNOWLEDGE INVOLVED

Based on the in-depth interviews and focus groups, seven groups of stakeholders were identified: (1) the owners, (2) Monumentenwacht, (3) contractors, (4) professionals (architect, engineer, historian), (5) local heritage agency, (6) Flemish heritage agency, (7) local community (neighbours, friends).

Some owners are interested in actively gaining knowledge on both the organisation and technical aspects of maintenance activities. They follow several paths to gain this knowledge. Some of them actively question professionals, such as Monumentenwacht, contractors, architects and historians. Some indicate that knowledge is transferred in their family from one generation to another. Many learn from their property and from their mistakes: “once you have a collision in the gutters, and resulting infiltrations, you learn to plan a yearly cleaning of the gutters”. Owners also question their friends and neighbours on works they have done. As part of the activities of this research, the private owners visited each other’s properties. These visits revealed the need for owners of historic buildings to connect and learn from each other. During the focus group, the owners referred to a need for a local network of owners of historic properties.

Most private owners are interested in finding professionals they can trust upon for the good quality and organisation of their maintenance activities. They consider Monumentenwacht to be an important partner, who offers objective advice of a high quality. However the service offered by Monumentenwacht is insufficient for the full maintenance process. Some owners indicate the difficulties in putting the recommendations into practice. In the urban environment, many owners indicated that they have difficulties in finding good and reliable contractors who have experience with historic buildings and are willing to come for small repairs. In the rural area this seems to be less of a problem. Only one of the private owners contacts an architect for maintenance works. That means that the initial diagnosis that is done by Monumentenwacht is hardly ever investigated more in depth. Here we note a discrepancy between theory and practice. The state of the art, in section 3.1, advises to develop a diagnosis in order to tackle the causes rather than the symptoms. The case study investigation however did not reveal any problems due to the lack of a detailed diagnosis. This could also be due to the fact that in practice the detected damages could be linked to their causes without a need for a detailed investigation.

CONCLUSIONS

Even though owners appreciate the expertise and thoroughness of Monumentenwacht, only four private owners and two churches really have their properties regularly inspected and act upon the inspection reports. There are three main reasons why the owners of the other investigated cases did not rely on Monumentenwacht: (1) the property was in such a bad state that it first needed a restoration, maintenance was thus postponed (2) the owners perform their own regular inspections and only ask the advice of Monumentenwacht when they need specific expertise or advice, mostly as part of larger interventions, (3) they had no prior knowledge on the existence of Monumentenwacht.

Owners indicate that the main aim of maintenance is to safeguard the state of preservation of the building. The incentive for maintenance works is to keep the (financial) value of the ownership or to reduce financial spending later. The main reason why owners in the rural area did not act upon the reports of Monumentenwacht is a lack of necessary financial resources. In the urban environment, two reasons were given why some recommendations are not followed: (1) private owners had difficulties translating the recommendations into actual interventions, (2) private owners had difficulties in finding good contractors with expertise in historic buildings for small repair. The public owners tend to consistently use the inspection reports for prioritizing and planning interventions, based on their annual budgets.

In spite of having a good monitoring by Monumentenwacht, (maintenance) interventions do not always have the expected outcome. Firstly, three of the selected private cases demonstrate how the lack of maintenance leads to the loss of authentic fabric. Secondly, good intentions of owners can be jeopardized by the inability to control the quality of executed interventions. Thanks to the monitoring of Monumentenwacht, the owners of case PR-UE-02 were able to solve the bad execution of interventions. Finally, the use of less durable materials as a consequence of cutting budgets during repair and restoration leads to less durable solutions. Also the owners of case PR-UE-05 were informed and sensitized on the shorter life span of the roofing materials thanks to the regular monitoring by Monumentenwacht. The case studies therefore demonstrate the effectiveness and advantages of regular monitoring and maintenance activities in prevention and early detection of damages, despite other influencing factors.

It was found that Monumentenwacht is an important stakeholder in the maintenance process, since they offer objective advice of a high quality. However, their services are insufficient for the full maintenance process. Owners need good and reliable professionals who can guide them in the execution of interventions. Furthermore, owners referred to a need for a local network of owners of historic properties, as a means to connect and learn from each other.

REFERENCES

- Dann, N. (2013). Preventive Conservation Maintenance in England: Constraints, Opportunities and Lessons. In: K. Van Balen and A. Vandesande (eds), *Reflections on Preventive Conservation, Maintenance and Monitoring of Monuments and Sites*. Leuven: Acco, pp. 95-100.
- Dann, N. and Cantell, T. (2005). Maintenance: From Philosophy to Practice. *Journal of Architectural Conservation*, 11(1), pp. 42-54.
- Dann, N. and Wood, S. (2004). Tensions and omissions in maintenance management advice for historic buildings. *Structural Survey*, 22(3), pp. 138-147.
- Dann, N. and Worthing, D. (2005). Heritage organisations and condition surveys. *Structural Survey*, 23(2), pp. 91-100.
- Dann, N., Worthing, D. and Bond, S. (1999). Conservation maintenance management - establishing a research agenda. *Structural Survey*, 17(3), pp. 143-153.
- Della Torre, S. (2013). Planned Conservation and Local Development Processes: the Key Role of Intellectual Capital. In: K. Van Balen and A. Vandesande (eds), *Reflections on Preventive Conservation, Maintenance and Monitoring of Monuments and Sites*. Leuven: Acco, pp. 123-127.
- Feilden, B. M. and Jokilehto, J. (1998). *Management and guidelines for World Heritage Sites*. Rome: International Centre for the Study of the Preservation and Restoration of Cultural Property.
- Forster, A. and Kayan, B. (2009). Maintenance for historic buildings: a current perspective. *Structural Survey*, 27(3), pp. 210-229.
- Glaser, B. G. and Strauss, A. L. (1967). *The discovery of grounded theory: strategies for qualitative research*. Chicago: Aldine Publishing Co.
- Icomos (1999). The Burra Charter.
- Icomos (2003). Principles for the analysis, conservation and structural restoration of architectural heritage.
- Marconi, P. (1984). *Arte e cultura della manutenzione dei monumenti (E: Art and culture of maintenance of monuments)*. Bari: Laterza.
- Moioli, R. (2013). Non-use values and the assessment of performance of preventive and planned conservation. In: K. Van Balen and A. Vandesande (eds), *Reflections on Preventive Conservation, Maintenance and Monitoring of Monuments and Sites*. Leuven: Acco, pp. 95-100.
- Mortelmans, D. (2013). *Handboek kwalitatieve onderzoeksmethoden (E: Manual on qualitative research methods)*. Leuven: Acco.
- Van Balen, K. (1988). Stabiliteitsherstel in monumentenzorg (E: structural consolidation in monument conservation). In: R. M. Lemaire and K. Van Balen, *Stable-Unstable?*. Leuven: Leuven University Press, pp. 15-27.
- Van Balen, K. (2015). Preventive conservation of historic buildings. *Restoration of Buildings and Monuments*, 21(2-3), pp. 99-104.
- Van Balen, K. and Vandesande, A. (2013). Introduction. In: K. Van Balen and A. Vandesande (eds), *Reflections on Preventive Conservation, Maintenance and Monitoring of Monuments and Sites*. Leuven: Acco, pp. ii-vi.
- Vandesande, A. (2017). *Preventive Conservation Strategy for built heritage aimed at sustainable management and local development*, PhD dissertation, KU Leuven.
- Verstrynge, E., Schueremans, L. and Smars, P. (2012). Controlled intervention: Monitoring the dismantlement and reconstruction of the flying buttresses of two gothic churches. *International Journal of Architectural Heritage*, 6(6), pp. 689-708.

changes

Changes in Cultural Heritage Activities: New Goals and Benefits for Economy and Society

Uploaded in December 2017.