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Research article

The Monumentenwacht model for preventive conservation of built heritage: A case study of Monumentenwacht Vlaanderen in Belgium

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Abstract Monumentenwacht (Monument Watch) is an organization that specializes in the periodic inspection of built heritage to raise awareness among owners and caretakers of the importance of proper maintenance and preventive conservation. It originated in the Netherlands in 1973. It was later established in Belgium, Germany, the UK, Denmark, Hungary, Italy, Slovak, Spain, France, and Portugal in the form of similar organizations and projects with similar aims. The organization promotes the idea of "prevention is better than cure" by offering periodic inspection, monitoring, and minor urgent repair and writing independent professional inspection reports as a reference for owners and users for further maintenance and conservation activities. This study explores the working mode of Monumentenwacht in Flanders, Belgium, including its historical development, organizational structure, inspection team configuration, professional inspection report, database, reporting system, and technical manuals. A brief analysis of other similar organizations and projects in various European countries is included to reveal efficient ways to promote this model while respecting different cultural, economic, social, legal, and political contexts.

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1. Introduction

Monumentenwacht (Monument Watch) is an organization that specializes in the periodic inspection of built heritage. It originated in the Netherlands in 1973. It promotes the idea that “prevention is better than cure” by offering periodic inspection, monitoring, and minor urgent repair and writing independent professional inspection reports, which serves as a reference for owners and users for further maintenance and conservation activities to raise their awareness of the importance of proper maintenance and preventive conservation. In 1991, Monumentenwacht Vlaanderen was established in the Flemish region of Belgium with similar aims of the Monumentenwacht in the Netherlands. In 1998, the Dutch Monumentenwacht organized a large-scale exhibition to celebrate its 25th anniversary. In 2000, the First International Conference Monumentenwacht was held in Amsterdam within the framework of the EU’s “Europe, a common heritage” with 27 representatives from 11 countries.¹ After decades of successful practice, Monumentenwacht has been promoted as a model for periodic inspection, maintenance, and preventive conservation of built heritage. Scientific studies on the Monumentenwacht model was carried out in the EU FP6 project SPRECOMAN (Seminars preventive conservation and monitoring of the architectural heritage) in 2006. Later, Monumentenwacht Flanders became a partner of the UNESCO Chair on Preventive Conservation, Monitoring, and Maintenance of Monuments and Sites (PRECOM³OS), which was established at KU Leuven (Belgium) in 2009. Since then, Monumentenwacht’s experiences in inspection, monitoring, and maintenance have been regarded as a successful case for promoting preventive conservation approaches in the field of built heritage (Lipovec and Van Balen, 2008; Santana Quintero, 2008; Meul and Stulens, 2010; Wu, 2014; Vandesande, 2017).

This study aims to promote the successful practices of Monumentenwacht to other organizations in different countries. It presents the working mode of Monumentenwacht in the case of Monumentenwacht Flanders in Belgium and introduces its historical development, organizational structure, inspection team configuration, professional inspection report, database, reporting system, and technical manuals. It also provides a brief analysis of other similar organizations or projects in different European countries to explore the efficient ways to promote

such a model in different cultural, economic, social, legal, and political contexts.

2. Case study: Monumentenwacht Flanders

2.1. History and organization system

In 1991, the founders of Monumentenwacht Flanders knew of the Flemish government’s plan to issue some maintenance regulations²; they were inspired by Monumentenwacht’s practices in the Netherlands to establish Monumentenwacht Flanders with similar aims and systems:

- having one front office in each province in Flanders and an umbrella organization;
- promoting the idea that “prevention is better than cure”;
- offering periodic inspection, minor urgent repair, and written professional inspection reports by the inspection teams;
- using a membership system, where owners/users can register as a member for an annual membership fee of 40 euros/year and an inspection fee of 45 euros/hour on site/person.

Since then, Monumentenwacht Flanders has gradually developed its characteristics:

- The umbrella organization is responsible for communication, coordination, quality control, and training. It also provides consulting services to the five provincial Monumentenwacht, with consultants for each type of heritage, budget plan, and ICT.
- Besides architectural heritage, valuable interior receives similar services since 1997, maritime heritage since 2008, archaeological sites since 2009, and long-term maintenance plan with a budget plan and the supervision of maintenance projects from 2011 to 2019.
- It employs specialists in built heritage, art historians, and archaeologists and high profiled craftsmen as inspector craftsmen.
- It provides services for private and public owned heritage, which can be non-listed or listed.³

Most of the initial start-up funds were provided by the King Baudouin Trust. Its funding came mainly from the Flemish government and provincial governments, membership, and

¹ The conference proceedings were officially published in 2002: Stichting Nationaal Contact Monumenten, 2002. First International Conference Monumentenwacht, Monumentenwacht Netherlands, Amsterdam.

³ According to the 2019 statistics, the member buildings of Monumentenwacht Flanders are composed of more or less 2/3 listed and 1/3 non-listed built heritage.

² Between 1970 and 1993, Belgium evolved from a unitary state to a federal structure. In this evolution, the national heritage care was taken over by three regions: the Flemish Region (Flanders), the Walloon Region, and the Brussels-Capital Region. From the beginning of the 1990s, the Flemish government had plans to set up some regulations for the maintenance of built heritage in Flanders. In 1993, the Flemish government implemented the 1976 Decree on the conservation of monuments and urban and rural landscapes (Decreet tot bescherming van monumenten en stads-en dorpsgezichten). A governmental decision obliges users and owners to maintain and conserve their protected architectural heritage, namely, the exterior of a monument or property located within a protected group of monuments and sites, the interior of a protected monument, and the conservation of surroundings and environment. Specific articles on the maintenance of chimneys, church bells and clocks, funereal monuments, industrial archaeological sites (...) are available. Referring to Belgisch Staatsblad 10-03-1994. *Besluit van de Vlaamse Regering van 17 November 1993 tot bepaling van de algemene voorschriften inzake instandhouding en onderhoud van monumenten en stads-en dorpsgezichten.*

inspection fees. Before 2014, the organization obtained 60% funding from the provincial government, 30% from the Flemish government, and 10% out of membership and inspection fees. Since 2014, five provincial front offices were incorporated into the provincial government; the funding of the provincial agencies is composed of 85%–90% from the provincial government and 10%–15% from membership and inspection fees, whereas 2/3 and 1/3 of the funding of the umbrella organization are provided by the provincial governments and the Flemish government, respectively.⁴

Although the largest amount of funding comes from the Flemish and provincial governments, Monumentenwacht in Flanders insists on providing independent consulting and services. Some of the staff members work for Monumentenwacht and provincial cultural heritage agencies, thus exposing the ideas and practices of Monumentenwacht Flanders to policymakers and helping raise awareness of preventive conservation among them, which help promote positive policies. Given that the annual membership fee is not high and the inspection fee is lower than the market price due to government subsidies, more than 95% of members retain their membership,⁵ and new members are added each year.

2.2. Inspection team and their work

The inspection work is carried out by an inspection team of two inspectors using a professionally equipped vehicle⁶ (Fig. 1). At the beginning of Monumentenwacht in Flanders, an inspection team consisted of two inspectors, one architect/engineer with a master's degree and one craftsman. However, almost all inspectors nowadays are responsible for their inspections and have to write the inspection report. Thus, they need to have an overall profile that shows good general knowledge of built heritage. The inspectors are not required to have a master's degree. They can choose their colleagues when setting up a compatible team with wide knowledge.

Training is available for new inspectors. For example, architectural inspectors who use industrial rope techniques follow at least 6 training days a year. Following safety training, training on preventive conservation and heritage



Fig. 1 The professional vehicle of Monumentenwacht Flanders © authors.

practices are organized two to four times per year for all inspectors. The training is on different topics concerning on-site inspection or inspection report writing.⁷ Meanwhile, the inspectors are not always in the same group. They participate in other groups from time to time, to gain different knowledge from different people.

Each provincial Monumentenwacht in Flanders is responsible for the inspection of the built heritage of the members in its province. Normally, each inspector has a fixed list of member buildings and is familiar with all the buildings and their owners/users. Monumentenwacht Flanders encourages each inspector to become a friend of the owners/users. Doing so helps to establish a long-term relationship between the inspectors and owners/users, which improve the proper maintenance of the built heritage.

For on-site inspection, two inspectors work together to check for damage and risks (e.g., cracks, fungi, and pests), inspect the building, and record problems (to be). The architectural consultant from the umbrella organization sometimes joins the inspection team and gives some suggestions on specific problems.

For the inspection frequency, each province has its plan depending on the available staff and number of member buildings. Normally, they re-inspect once every 3–4 years for the architectural heritage and once every 6–7 years (even 10 years) for the interior. Sometimes, extra inspection is done following the requests of the owners/users.⁸ A

⁴ Each province provides an equal amount to the umbrella organization, whereas the Flemish government provides funding for special tasks and projects, such as archaeological sites and maritime heritage.

⁵ The resignation of a member is usually caused by a change of ownership.

⁶ The vehicle is standard equipped with customized in-car shelves and sometimes a writing desk and ladder lifting machinery. Each vehicle is equipped with inspection and recording tools, such as portable temperature and humidity detectors, crack meters, ropes and related equipment for industrial rope techniques, binoculars, laptop, and camera, and different materials for urgent minor repair works, such as rivets, tiles, slates, specific tapes, and lead. The requirements for the inspection vehicle can be, for example, 3-m long and 1.9-meter high loading space with a loading weight of 3–3.5 tons (no more than 3.5 tons to avoid problems with driver), sliding doors, partition walls with windows behind the cab, the back door with a ladder (for climbing to the roof to take the ladders), and shelves and cabinets with drawers where tools and materials are restored.

⁷ The new inspectors gain some basic training but learn the most by following several inspection teams on-site, reading the inspection reports of their colleagues, and starting to write professional inspection reports on their own under supervision. Sometimes, senior inspectors explain how to carry out the inspection efficiently and how to deal with urgent repair and other unexpected problems, and the inspection reports written by different inspectors are discussed, pointing out the existing problems and giving tips for further improvement.

⁸ The inspectors write letters to the (large) owners/users to ask whether they need an inspection in that year or in the upcoming years. Then, they schedule or contact the owner over time to arrange a new inspection. Normally, new members are given priority. An inspection is conducted shortly after they become members.

monitoring system is available for some specific risk issues, such as cracks or indoor micro-environment. For example, crack monitoring is usually performed once every 3–4 months. The indoor microenvironment is generally monitored for one month, and the monitoring data are analyzed afterward. No 24-h real-time monitoring is conducted.

2.3. Professional inspection report

Inspectors prepare all professional inspection reports, which is important work. After the on-site inspection, they usually spend some days drawing up the inspection report at the office.⁹ One inspector is responsible for the writing, whereas the other verifies whether omissions or mistakes are made. The report of each type of heritage has a template and general requirements, but the content may slightly vary based on the background and the writing style of the inspectors.¹⁰ Nevertheless, they try to give the same message to the users/owners.

Normally, in an inspection report, inspectors illustrate the current conditions of the member building, point out the main problems and challenges, and give suggestions on the urgent actions and how to carry out the proper maintenance for the long term. The completed inspection report is sent to the members. If the users/owners want to apply for the maintenance grants from the government, the inspection report can be used as an important reference document for the officials in deciding on the budget and the terms of the maintenance project. If the users/owners want to perform small maintenance for their buildings themselves, referring to the report and related brochures will be feasible for them (see Section 2.5).

The templates of the inspection reports vary for different types of heritage and frameworks for architectural heritage, valuable interior, archaeological sites, maritime heritage, and funeral heritage.

The inspection report for architectural heritage includes the following:

- the basic information of the location, listed level, inspection history, and contact;
- the evaluation of the current condition of the whole building, roofs, rainwater drainages, attic and roof construction, structure, windows/doors and joinery,

glass, historical technical installations, and surroundings;

- recommendations on maintenance and repair based on the current status;
- building parts that need attention (without treatment);
- appendix.

In the “evaluation of the current status,” the condition of the building (six levels: very poor, poor, fair, average, good, and excellent), maintenance (six levels: very poor, poor, fair, average, good, and excellent), and indirect risk (six levels: none, little, reasonable, considerably, high, and very high) is assessed in general, and the condition, maintenance, and indirect risk for roofs, rainwater drainages, attic and roof construction, structure, windows/doors and joinery, glasses, (historical) technical installations, and surroundings are assessed in detail (e.g., Fig. 2).

The recommendations have various suggestions based on different problems, and the contents usually include current problems (pointed out by drawings and pictures), corresponding professional recommendations (regarding links and brochures), size of the area to be repaired, priorities and periods, frequencies (once or at regular intervals), and responsible persons (different professional workers) (e.g., Fig. 3).

The contents and description methods of the issues that need special attention are similar to the “recommendation” part. In the annex, one-to two-page leaflets for maintenance can be posted at the entrance of a church or distributed to cleaning volunteers and other workers to point out the specific information needed during the cleaning and daily work and the links to the brochures for more details.

2.4. Database and reporting system

In 2016–2017, the former relational database in MS access¹¹ with all administrative data on members, member objects, and invoices transformed into a web-based relational database in MySQL, called iMAKS (Figs. 4 and 5). At the same time, the central database was extended with a reporting system to capture all data from the architectural inspections and draw uniform inspection reports called MAKsbo, which only work when connected with the Internet and the central database. All additional documents,

⁹ An architectural inspection on site takes a few hours to a few days, depending on the size and complexity of the construction. The duration of drawing up the inspection report is more or less the same as the time on site for regular re-inspections and 3–5 times the time on site for new inspections.

¹⁰ For example, some inspectors are experts in stone conservation and probably go into more details on stone materials. Some are engineers, and their reports may have more information on structures. Inspection reports do not have a fixed assessment system yet, but improving their quality is possible by mixing the teams and reading each other’s reports and having the director or consultant randomly read their reports for assessment.

¹¹ Since the late 1990s, information about members, member objects, inspection dates, and invoices is gathered in a central relational database in MS access. The database has been developed by an external developer who had experience with databases for some provincial Monumentenwacht in the Netherlands. In the beginning, every province had its own database. Monumentenwacht Flanders, as an umbrella organization, collected copies of those databases to obtain an overview and draw statistics. In 2007, an ICT consultant started at Monumentenwacht Flanders for the further development and maintenance of the database to draw queries and statistics. Over the years, information has been added to the database, including inspection-related information, such as condition scores out of the MS word reports and an overall building condition score, and information necessary for the daily work of Monumentenwacht, such as a risk inventory to each object, an inspection planning tool, and inventories of the safety equipment. Every province has access to its provincial data. Monumentenwacht Flanders has access to all the data.

The condition of the heritage is displayed in six levels for the entire building and per section and for three points of attention / De conditie van het erfgoed wordt voor het hele gebouw en per rubriek weergegeven op een 6-delige schaal, en dit voor 3 aandachtspunten:				
Condition of building / bouwfysische toestand	<i>excellent-good-average-fair-poor-very poor</i> / <i>uitstekend-goed-redelijk-matig-slecht-zeer slecht</i> This value is the conclusion of the current status of conservation of all inspected parts per section. It is a rough estimate of the material state of the heritage at the time of the inspection. / Dit is de conclusie van de huidige bewaringstoestand van alle geïnspecteerde onderdelen per rubriek. Het is een globale inschatting van de materiële staat van het erfgoed op het moment van de inspectie.			
Maintenance / onderhoud	<i>excellent-good-average-fair-poor-very poor</i> / <i>uitstekend-goed-redelijk-matig-slecht-zeer slecht</i> This value is an estimate of the maintenance performed and how maintenance, problems, and risks are followed up. Are roofs and gutters cleaned regularly? Is action taken quickly if a problem exists? Does the person responsible for the management pass regularly (e.g., weekly) and have an eye for problems? / Deze waarde is een inschatting van het uitgevoerde onderhoud en de manier waarop onderhoud, problemen en risico's worden opgevolgd. Worden daken en goten regelmatig schoongemaakt? Wordt snel ingegrepen als er een probleem is? Is er iemand verantwoordelijk voor het beheer die er regelmatig (vb. wekelijks) passeert en oog heeft voor problemen?			
Indirect risk / risico op gevolgschade	<i>none-little-reasonable-considerably-high-very high</i> / <i>geen-weinig-redelijk-aanzienlijk-verhoogd-acuut</i> This level indicates to what extent the danger of accelerated material damage or loss of heritage value is if the administrator does not intervene in time. These can be all kinds of possible risks, such as apparent minor problems that can cause serious consequential damage, misuse or management, increased risk of calamities, and bad climatic conditions for rare parts with a high historical value. / Deze schaal geeft aan in welke mate er gevaar bestaat voor een versnelde materiële verwerking of verlies van erfgoedwaarde als de beheerder niet tijdig ingrijpt. Het kan gaan om allerlei mogelijke risico's, zoals ogenschijnlijk kleine problemen die voor ernstige gevolgschade kunnen zorgen, een verkeerd gebruik of beheer, verhoogd risico op calamiteiten, slechte klimatologische omstandigheden voor zeldzame onderdelen met een hoge historische waarde.			
Entire Building / Gehele Gebouw				
Condition of building / bouwfysische toestand	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 33%;"></td><td style="width: 33%; background-color: yellow;"></td><td style="width: 33%;"></td></tr></table> average / redelijk			
Maintenance / onderhoud	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 33%;"></td><td style="width: 33%; background-color: yellow;"></td><td style="width: 33%;"></td></tr></table> average / redelijk			
Indirect risk / risico op gevolgschade	<table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="width: 33%;"></td><td style="width: 33%; background-color: yellow;"></td><td style="width: 33%;"></td></tr></table> average / redelijk			
Explanation / toelichting	The building is structurally sound, but various parts and materials run to their last years of life. If the situation is properly monitored and quick action is taken in the event of problems, the building will continue without major restoration work. / Het gebouw is structureel in orde, maar verschillende onderdelen en materialen lopen naar hun laatste levensjaren. Indien de toestand goed opgevolgd wordt ten er snel ingegrepen wordt bij problemen, kan het gebouw nog even mee zonder grote restauratiewerken.			

Fig. 2 The content of evaluation for the current status (translated by authors) © Monumentenwacht Flanders.

inspection reports, pictures, documentation on objects, and meeting reports were stored in a protected domain on Google drive. The advantage of the web-based database and reporting system is that every authorized person has access to it from all locations with web access (i.e., office, satellite office, home, and inspection site) to edit or consult data.

Switching from reporting in a text file to a database reporting system has advantages. The new reporting system and inspection format make securing information in a

central place possible while ensuring accessibility to all authorized employees. A database captures the data in a structured way, making data search easy and structured, which was hard to do when the reports were written in MS Word. The database also allows various users (i.e., members, contractors, volunteers, inspectors, and researchers) to export different kinds of reports (i.e., small, extended, and with specific content).

In the MAKsbo application, a dashboard contains all current inspections of a certain province. With a search

A2018/03 **When removing the fiber cement slates, asbestos removal and processing laws are taken into account. / Houd bij de verwijdering van de vezelcementleien rekeningen met de wetgeving rond asbestverwijdering en verwerking.**
Roof | roofing nailed | fiber cement slates / Dak | dakbedekking genageld | vezelcementleien

Status / toestand The slates may contain asbestos. / De leien bevatten mogelijk asbest
Explanation advice / See http://www.werk.belgie.be/lijst_asbestverwijderaars.aspx for recognized asbestos removers / Kijk op http://www.werk.belgie.be/lijst_asbestverwijderaars.aspx voor erkende asbestverwijderaars.
toelichting advies

Indicative area / 260 m²
indicatieve hoeveelheid

Priority / prioriteit 1–3 year / 1–3 jaar
Frequency / frequentie one-time / eenmalig

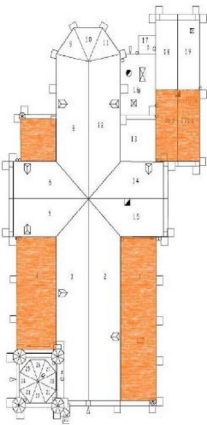
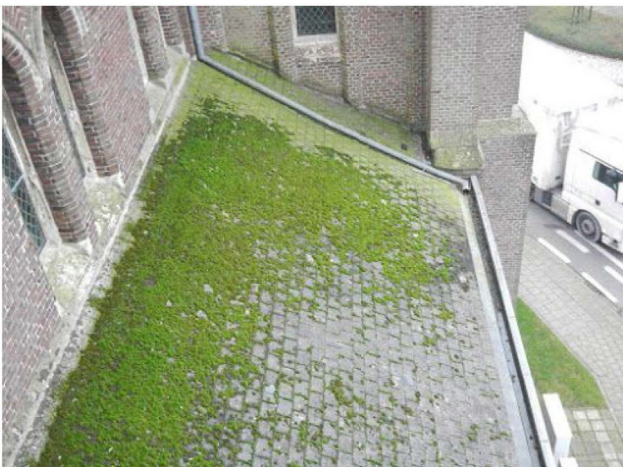



Fig. 3 The “Recommendation” part in the inspection report (translated by authors) © Monumentenwacht Flanders.

Menu	Objecten						+ TOEVOEGEN
	Objectnummer	Objectnaam	Straat	Deelgemeente	Gemeente	Eigenaar	
Adressen	21114	Provinciedomein Huizingen - Kasteel	Torleylaan 100	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Objecten	22061	HOOFDOBJECT: Catala-site	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Inspecties	22062	Catala-site - Productiehal	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Planning inspecties	22063	Catala-site - Grote schoorsteen	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Opvolging inspecties	22064	Catala-site - Portierswoning	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Prijzvoorstellen	22065	Catala-site - Kapel	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Facturen	22066	Catala-site - Directeurswoning	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Opvolging facturen	22067	Catala-site - Stookhuis	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Queries	22068	Catala-site - Stielplaats stoomlocomolief	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Rapportage	22080	Catala-site - Productiehal U	De Meurslaan 86	HUIZINGEN	BEERSEL	Vlaams-Brabant	
Mailings							
Maksbo							

Rijen per pag. 10 << 1 2 3 4 >>

Fig. 4 Sample overview objects (filtered) in iMAKS © Monumentenwacht Flanders.

The screenshot displays the 'Objecten' (Objects) section of the iMAKS application. The main form is divided into several sections:

- Objectnummer:** 21114
- Objectnaam:** Provinciedomein Hulzingen - Kasteel
- Adres:** Torleylaan 100, Postcode 1654, Gemeente BEERSEL.
- Hoofdobject:** 22268 (HOOFDOBJECT: Provinciedomein Hui objecten-eigenaar)*
- Verantwoordelijke object:** LEMBRECHTS Dirk
- Verantwoordelijke interieur:** DEKNOPPER Andries
- Oorspronkelijke functie 1:** Kasteel of buitenplaats
- Huidige functie 1:** Handel of horeca
- Oorspronkelijke functie 2:** (Empty)
- Huidige functie 2:** (Empty)
- Objectcategorie:** 5=50 x 50 x 40 (Kerk (100.000 m²))
- Opmerking object:** Betaalt geen lidgeld (lid provincie)

Below the form, there is a table for 'Abonnee' (Subscribers) with columns: Afdeling, Naam/ Afdeling, Vanaf datum, Tot datum, Deelgemeente, Telefoonnummer, and Laatste betaling lidgeld. The table shows one entry for 'Provincie Vlaams-Brabant'.

At the bottom, there is a navigation bar with tabs: CONTACT, INSPECTIES, FACTUREN, BESCHERMD EN WAARDEVOL, PLANNING, RI, CORRESPONDENTIE, and UITGEVOERDE WERKEN. Below the tabs, there is a table for 'Inspecties' (Inspections) with columns: Inspectie, Begindatum, Einddatum, Verslag, Verantwoordelijke verslag, Dienstverlening, and Dienstverlening.

Fig. 5 Sample object form in iMAKS © Monumentenwacht Flanders.

function, the finished inspection reports can be consulted. Small building pictures and/or filters make finding the required inspection easy (Fig. 6).

Starting up or re-entering an inspection in the reporting system, the interface is recognizable and based on a vertical navigation panel, representing the building parts (the whole building, roofs, rainwater drainages, attic and roof

The screenshot shows the 'Inspecties' (Inspections) dashboard in the MAKsbo application. The interface includes a left sidebar with filters for Objectnummer, Objectnaam, Adres, Inspectie ID, and Begindatum inspectie. Below the filters, there are 'Lopende rapporten' (Active reports) with buttons for 10, 20, and 50 reports, and a 'Filters toepassen' (Apply filters) button.

The main area displays a grid of inspection reports, each with a small image of the building and the following details:

- Sint-Jan Berchmanskerk (10496):** #A-4510496/2019/B - 4 Jun 2019, Brusselsesteenweg 51, 2800 MECHELEN
- Hangars Steen - Hangars Zuiderterras (10534):** #A-1410534/2019/B - 10 May 2019, Scheldekaai 20 en 21/Ernest Van Dijkkaai, 2000 ANTWERPEN
- HOOFDOBJECT: Domein Hof van Lyere (10556):** #A-7710556/2019/B - 16 May 2019, Hofde 2-3, 2240 ZANDHOVEN
- Sint-Luciakerk (10718):** #A-2410718/2019/B - 12 Jun 2019, Einhoutseweg 38, 2440 GEEL
- Gesloten boerderij (10844):** #A-1410844/2019/B - 15 Mar 2019, Kattestraat 8, 2880 BORNEM
- Pastorie Sint-Bavo (10844):** #A-2810864/2019/B - 26 Mar 2019, Ring 9, 2200 NOORDERWIJK
- Herenhuis Wifhof of Dieltjenshof (10972):** #A-7710972/2019/B - 24 May 2019, Dorp 16, 2242 PULDERBOS
- Hangbrug (10978):** #A-0210978/2019/B - 5 Jun 2019, Stadspark z.n., 2018 ANTWERPEN
- Kasteel de Merode - Kasteel (11223):** #A-7111223/2019/B - 23 Jan 2019, Poldersstraat 51, 2260 WESTERLO
- Appartementsgebouw (11345):** #A-0211345/2019/B - 8 May 2019, Pourbusstraat 3-5, 2000 ANTWERPEN
- Hof ter Laeken - Kasteelhoeve Neerhof (11354):** #A-2611354/2019/B - 12 Jun 2019, Hofdreef 2, 2221 BOOISCHOT
- Heilig Hartkerk (11342):** #A-1611362/2019/NB - 31 May 2019, Kapelsesteenweg z.n., 2930 BRASSCHAAT
- Pastorie Sint-Cordula (11468):** #A-6411468/2019/B - 31 Dec 2019, Verberstraat 23, 2800 SCHOTEN
- Woonhuis (11554):** #A-5011524/2019/B - 11 Jun 2019, Kapellelei 34, 2640 MORTSEL
- Kasteel de Merode - Koetshuis (11628):** #A-7111628/2019/B - 23 Jan 2019, Poldersstraat 51, 2260 WESTERLO

At the bottom, there is a footer with 'Privacy - Terms and Conditions' and 'Alle rechten voorbehouden voor Monumentenwacht 2019, ontwikkeld in samenwerking met Minco.'

Fig. 6 MAKsbo dashboard © Monumentenwacht Flanders.

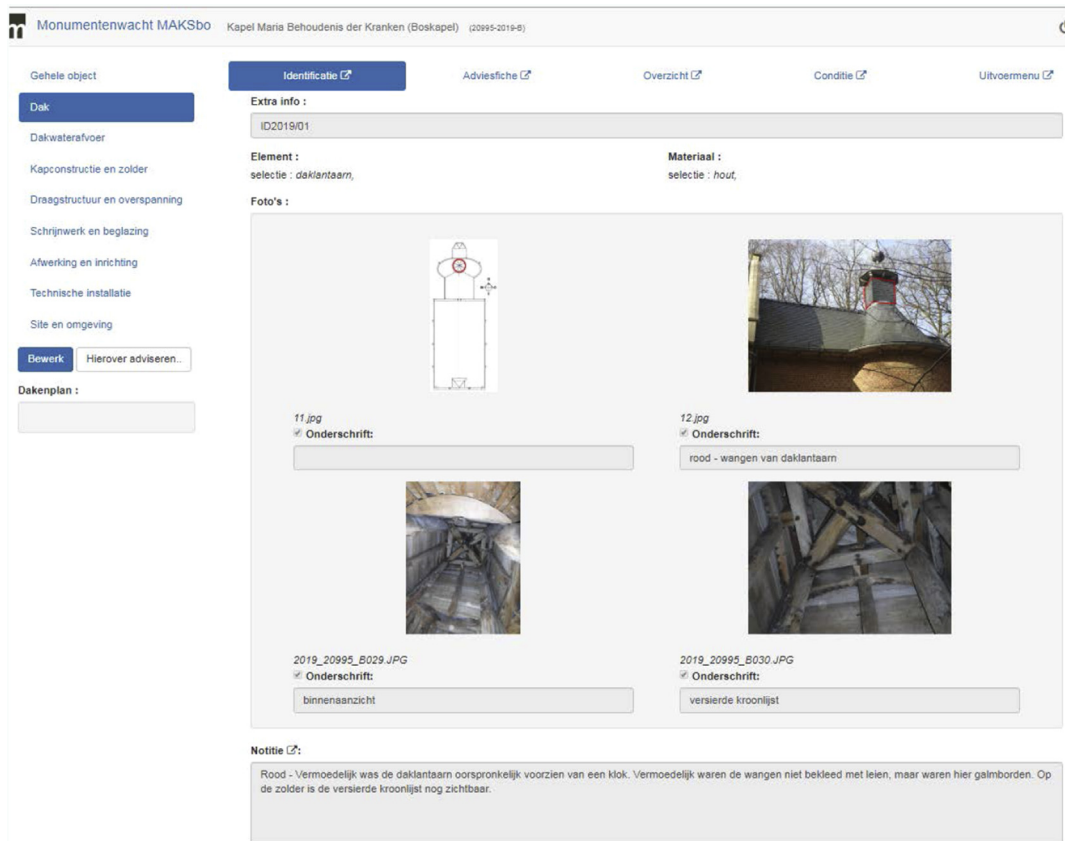


Fig. 7 An overview of an ID-sheet in MAKSbo © Monumentenwacht Flanders.

construction, structure, windows/doors and joinery, glasses, historical technical installations, and surroundings) and a horizontal navigation menu (Fig. 7). The interface for each action is linked to the horizontal navigation menu. The fixed list of building parts is extendable in the future or can be replaced by others for different kinds of inspection (i.e., mills, interiors, and archeology). The horizontal navigation menu represents different actions to capture the data and fill out a report:

- **ID:** The building parts are identified. This file contains fixed information about all building parts. Such information does not change between two inspections, such as a description of the composition or structure of the building parts, materials, reference pictures and plans, and further notes (if necessary).
- **Advice:** The recommendations are linked to certain ID's by element and material labels. A brief recommendation "what" can be enlarged by the information on the condition of the building or building part "why" and maintenance leaflets or advice on "how" to carry out the brief recommendations. Every advice contains an estimation of the size of the work to be carried out, a priority (i.e., urgent or long term), and a frequency (i.e., once, repeated every x years, or y times a year) "when."

Pictures and plans should clarify the locations "where" the maintenance or repair is to be carried out and the seriousness of the problems or risks. They must be a reference for following inspections. Indicating 'who' should carry out the maintenance, repair, or investigation (i.e., specific contractor, architect, and the owner) is also possible.

- **Overview** of the given advice or IDs.
- **Condition and general remarks:** These remarks contain a menu that indicates the condition of the whole object and its different parts in terms of physical state, maintenance, and risks. A short text can explain the general condition of the building and its parts. Some general remarks can be located on the first page of the standard inspection report.
- **Menu to export data in a report.** At this moment, a few options are available, namely, a standard report with or without all or selected ID-sheets and a table with an overview of all recommendations. These kinds of reports can be extended.

An important part of the new reports is the table with an overview calendar of all recommendations over 12 years (Fig. 8).¹² Although architects or contractors are familiar

¹² Fig. 8 is an example of an overview calendar with the following information in columns: A - reference number referring to extended information in the inspection report; B - recommendation (linked to a building part with main materials); C - measuring unit (i.e., meter, cubic meter, and piece); D - indication of quantity; E - frequency (i.e., once only, to be repeated every 4 years, and to be repeated twice a year); F - person who should follow up the recommendation (i.e., owner, contractor, and volunteer); G to S - year or period in which the recommendation should be carried out (i.e., from "urgent" or "within a year" [red column] to "long term" [light yellow columns]).

m OVERZICHT VAN DE ADVIEZEN 50xxx-2017-B Voorbeeldkerk 10XX GEMEENTE		code	rubriek element materiaal verkort advies	eenheid	indicatieve hoeveelheid	frequentie	uit te voeren door	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Gehele gebouw																				
A2018/02	Gehele gebouw toegankelijkheid en bereikbaarheid Maak daken en goten goed bereikbaar voor onderhoud en inspectie.	SOG	1	1x	Dakwerker								x							
A2018/18	Gehele gebouw toegankelijkheid en bereikbaarheid loopbrug trap Herstel en verbeter ladders, trappen en loopbruggen, opdat alle delen van het gebouw veilig bereikbaar zijn.	n.t.b.	-	1x	Schrijnwerker Timmerman				x											
A2018/23	Gehele gebouw vuil en hygiëne dieren Houd zolders, trappen en ladders vrij van vuil en dieren.	n.t.b.	-	5j.					x						x					x
A2018/06	Gehele gebouw Contacteer de monumentenwachters bouwkunde voor een inspectie.	u	10	4j.	Monumentenwacht				x					x					x	
Dak																				
A2018/01	Dak dakbedekking genageld natuurleien koper Dakvlakken regelmatig nakijken en gebroken, geperforeerde en weggeschoven leien herstellen.	n.t.b.	-	j.			x	x	x	x	x	x	x	x	x	x	x	x	x	x
A2018/24	Dak dakbedekking genageld natuurleien vezelcementleien Voorzie een vernieuwing van alle dakbedekkingen, bij voorkeur in natuurleien, en aansluitingen op middellange termijn.	n.t.b.	-	1x	Dakwerker															x
A2018/03	Dak dakbedekking genageld vezelcementleien Houd bij de verwijdering van de vezelcementleien rekening met de wetgeving rond asbestverwijdering en verwerking.	m ²	260	1x					x											
A2018/07	Dak aansluitingen kilkeper zink De kilgoten vernieuwen, samen met de vernieuwing van de hoger gelegen daken.	m	20	1x																x
A2018/08	Dak dakluik zink hout Zinken dakluiken vernieuwen.	st	2	1x									x							
A2018/09	Dak topbekroning smeedijzer Smeedijzeren topbekroningen herstellen.	st	7	1x																x
Dakwaterafvoer																				
A2018/10	Dakwaterafvoer goten zakgoot zink De zinken gootbekleding van dak (18, 18bis) en de wandeling rond de torenspits vernieuwen, samen met de sterk geïmpregneerde afvoerbuizen.	m	35	1x					x											
A2018/04	Dakwaterafvoer plat dak goten Goten en daken regelmatig proper maken, zodat een vlotte regenwaterafvoer gewaarborgd wordt. Kijk eveneens de controleputjes na.	u	4	2x/j.			xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx	xx
Draagstructuur en overspanning																				
A2018/15	Draagstructuur en overspanning voegwerk deksteen witte kalk- of zandsteen Voegen en barsten in dekstenen die water dooralten die aanleiding kunnen geven tot vorstschade herstellen met een compatibele voegmortel.	n.t.b.	-	1x					x											
A2018/11	Draagstructuur en overspanning metselwerk voegwerk baksteen witte kalk- of zandsteen Vlak baksteenmetselwerk, onderdelen zoals waterlijsten... in witte steen herstellen en hervoegen met een aangepaste voegmortel (kalk).	n.t.b.	-	1x									x							
A2018/12	Draagstructuur en overspanning raamonlijsting moneel witte kalk- of zandsteen Raamonlijsten controleren en herstellen.	n.t.b.	-	1x			x													

Fig. 8 Example of an overview calendar © Monumentenwacht Flanders.

with this kind of sheet, it is a new way of presenting information to owners with less technical knowledge. This calendar should raise the awareness of the owner/caretaker that certain works must be repeated every few years or a few times a year (e.g., repainting wooden elements in the exterior and cleaning gutters). The table is an instrument that the owner can refine or extend with extra columns or a cost simulation to use in a management plan or log (Fig. 9).¹³

2.5. Illustrated technical brochures for maintenance

In the past decades, Monumentenwacht Flanders has published 27 technical brochures (before 2019) (Table 1).

All brochures were written by inspectors or consultants with colorful pictures, simple words, and detailed explanations, providing convenient tips for proper maintenance of various components, materials, and crafts against different

types of damages (e.g., Figs. 10 and 11). They are easy to read for conservation experts or common users of historic buildings. Inspectors use them as references when they prepare their professional inspection reports and provide members with their reports with 1–2-page maintenance leaflets. The leaflets give handy information regarding cleaning, proper maintenance, and other work, whereas the brochures provide more general information regarding proper maintenance for a certain material or building part. The brochures are training materials for new inspectors and are available to the public. Anyone interested in professional knowledge about maintenance can buy them or download them for free and use them as a reference.

2.6. MOWA flanders vs. heritage policy in Belgium

In 1993, the Flemish government set up a separate maintenance grant with a defined scope for the protected monuments. The difference between a restoration grant and a maintenance grant presented an important turning point toward preventive awareness at the Flemish governmental level; as stated in the 802 document of Vlaams Parlement 1997, “in order to create a sustainable policy, it is important to promote a preventive maintenance policy”.¹⁴ The Flemish government gave financial support to

¹³ Fig. 9 is an example of an extended overview calendar with cost estimation. A few columns are added following the table in Fig. 8 (i.e., between B and C: measuring code [i.e., fixed quantity, variable quantity—estimation, and sum of different parts]; between E and F: two columns are added [i.e., one for the price pro unit and one for the total price in the year]), and columns crosses are replaced by the price of the works for a specific recommendation in a specific year. At the bottom of the table, some rows are added following the table in Fig. 8 to present the total cost per year or per period, which is not visible in this figure.

¹⁴ Vlaams Parlement. 1997. Stuk 802 (1997–1998), 1. Beleidsbrief Cultuur: Beleidsprioriteiten 1998, bijlage Oriëntatienota Monumentenzorg.

m code localite	KOSTPRIJSINDICATIE 17 april 2018 50XXX XX-kerk Straat & nr - POSTCODE GEMEENTE							2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
	rubriek element materiaal verkoft advies	mestcode	eenheid	indicatieve hoeveelheid	frequentie	eenheidsprijs	totaal / jaar													
Algemene opmerkingen																				
Deze kostprijsindicatie is gebaseerd op de aanbevelingen van het inspectieverslag van Monumentenwacht West-Vlaanderen (50XXX-2017-B)																				
Reguliere onderhoudswerken																				
Abonnement Monumentenwacht West-Vlaanderen.		sog		1,00	j.	40,00	40,00	Monumentenwacht	40,00	40,00	40,00	40,00	40,00	40,00	40,00	x	x	x	x	x
A2018/06	Gehele gebouw Contacteer de monumentenwachters bouwkuude voor een inspectie.	vh	u	10,00	4j	45,00	450,00	Monumentenwacht			450,00				x				x	
A2018/04	Dakwatersafvoer plat dak goten Goten en daken regelmatig proper maken, zodat een vlotte regenwaterafvoer gewaarborgd wordt. Kijk eveneens de controlerijps na.				2xj.															
	herfst Uitkuisen van alle goten en daken, ook de hoger gelegen, met specifieke aandacht voor het knooppunt van de afvoerbuizen onder de goten van de torenwandeling.	sog		1,00	j.	700,00	700,00	Algemeen aannemer Dakwerker	700,00	700,00	700,00	700,00	700,00	700,00	700,00	x	x	x	x	x
	+ Huur hoogwerker voor uitvoeren reinigingswerken.	vh	dag	1,00	j.	300,00	300,00	Verhuurbedrijf	300,00	300,00	300,00	300,00	300,00	300,00	300,00	x	x	x	x	x
	lente Uitkuisen van de lager gelegen goten en daken (ladderwerk - geen hoogwerker nodig).				j.			Eigen beheer	x	x	x	x	x	x	x	x	x	x	x	
A2018/05	Schrijfwerk en beglazing dakkapel buitenschrijfwerk deur raam boordplank hout Buitenschrijfwerk regelmatig herschilderen, waar nodig, na een grondig herstel.																			
	- Plaatselijk bijwerken en herschilderen van de boordplanken van de goten.	vh	m	150,00	5j.	40,00	6.000,00	Schilder	6.000,00				6.000,00						x	
	+ Huur hoogwerker voor uitvoeren schilderwerken aan de boordplanken.	vh	week	2,00	5j.	1.000,00	2.000,00	Verhuurbedrijf	2.000,00				2.000,00						x	
	- Plaatselijk bijwerken en herschilderen van de deuren.	vh	m²	17,00	5j.	50,00	850,00	Schilder	850,00				850,00						x	
	- Regelmatig herschilderen van de diefziers (sacristie en toilet).	vh	m²	7,00	5j.	65,00	455,00	Schilder	455,00				455,00						x	
	- Regelmatig herschilderen van de gietijzeren standpalen onderaan de afvoerpijpen.	vh	st	2,00	5j.	75,00	150,00	Schilder	150,00				150,00						x	
	- Regelmatig herschilderen van de dakkapellen na een grondig herstel/vervangings (voor herstel zie hieronder bij 'restauratiewerken' - het herstel of vervangen van het schrijfwerk van de dakkapellen gebeurt best samen met de vernieuwing van de dakbedekking).	vh	st	7,00	5j.	50,00	350,00	Schilder			herstel (zie verder)		350,00						x	
	- Regelmatig herschilderen van de ramen van de sacristie en het toilet na een grondig herstel/vervangings (voor herstel zie hieronder bij 'restauratiewerken').	vh	m²	7,00	5j.	50,00	350,00	Schilder			herstel (zie verder)								x	
A2018/20	Technische installatie bliksembeveiliging Laat de werking van de bliksembeveiliging regelmatig nakijken door een erkend controle- organisme.	Onderhoudscontract aangaan met een gespecialiseerde firma - om de 1 tot 5 jaar, afh. van de intrinsieke waarde van het gebouw en de omstandigheden waarin het zich bevindt.											x				x			
A2018/21	Technische installatie klokkenstoel klok Smeer de bewegende delen van de klok regelmatig en kijk de verbindingen na. Kijk de klokkenstoel na en houd deze en de vijeren vrij van vuil.	Onderhoudscontract aangaan met een gespecialiseerde firma - om de 2 jaar.							x		x		x		x		x		x	
A2018/22	Site en omgeving begroeiing Onderhoud regelmatig de beplanting rond de kerk. Vooral klimop regelmatig snoeien of verwijderen.				j.			Eigen beheer	x	x	x	x	x	x	x	x	x	x	x	

Fig. 9 Extended overview calendar to a long-term maintenance plan © Monumentenwacht Flanders.

maintain and restore protected monuments, whereas the local government gave more financial contributions to the maintenance of the non-protected valuable built heritage (e.g., in 1996, the Province of Oost-Vlaanderen installed a provincial maintenance grant) (Vandesande, 2017). Compared with the complex application process and long waiting time for the approval of the restoration grant, applying for a maintenance grant is simpler and has a shorter-waiting time.

Given the general mind switch to maintenance in the heritage field in Flanders/Belgium/Europe, the bottom-up

approach, and such policy incentives, MOWA Flanders grew quickly. The inspection reports are accepted as "certificate" documents to obtain the maintenance grants from the government and professional manuals for owners/users to carry out proper maintenance. The Flemish government's policy on maintenance grants has changed since 2004,¹⁵ but MOWA Flanders continues to act as a connecting factor among professionals, owners/users, and governmental officials (Wu, 2014, 2018).

The Brussels Region or the Walloon Region has no MOWA although both regions also developed a policy of

¹⁵ In 2004, the Flemish government started to implement maintenance plans by means of a long-term maintenance envelope for monuments, protected sites, towns, and villages. An amendment enabled the long-term maintenance plans' grants for non-legally protected architectural heritage in protected towns and villages. In 2010, an amendment was made to the 2004 maintenance grant decision, stating that protected built heritage owned by local and regional government could no longer take advantage of the Flemish Government maintenance grants, with the exception of "without economic purpose" (zonder economisch nut) monuments. In 2015, legislation changed again by operating the renewed immovable heritage decree (Onroerend-erfgoed-decreet) of July 12 in 2013. Local authorities gained more responsibility in heritage management. However, the Flemish government cancelled the maintenance grant for legally protected monuments. Two procedures are available when asking for a heritage grant. The simple procedure by which you can start faster (in 90 days) with a limited budget of € 25.000 could be used for maintenance and small repairs although specific maintenance works, which every building owner should carry out, are no longer entitled for grants. A specific long-term maintenance grant with no maximum budget still exists for large complexes, but the wait could take up to a few years. In 2019, some rates for grants have been reduced, but a 10% extra can be obtained if the person in-charge has been taking good maintenance of the heritage for the last 6 years. Referring to Belgisch Staatsblad 23/02/2004. *Decreet houdende wijziging van het decreet van 3 maart 1976 tot bescherming van monumenten en stads-en dorpsgezichten*; Belgisch Staatsblad 29-11-2010. *Besluit van de Vlaamse Regering van 19 november 2010 tot wijziging van het besluit van de Vlaamse Regering van 14 juli 2004 tot het vaststellen van een onderhoudspremie voor beschermde monumenten en stads-en dorpsgezichten wat betreft premies voor lokale en regionale besturen en voor autonome provincie- en gemeentebesturen met rechtsperoonlijkheid*; *Decreet betreffende het onroerend erfgoed (citeeropschrift: "het Onroerenderfgoeddecreet van 12 juli 2013")*.

Table 1 27 brochures published by Monumentenwacht Flanders (© authors).

	Title	Page number	Year of publication
Maintenance for different types of heritage	Maintenance of concrete heritage (Onderhoud van betonnen erfgoed)	60	2017
	Maintenance of ruins (Onderhoud van ruines)	64	2015
	Maintenance of funeral heritage (Onderhoud van funerair erfgoed)	76	2011
Maintenance of components, materials, and crafts	Grease: heritage maintenance with natural products (Smeerlapperij: erfgoed onderhouden met natuurlijke producten)	48	2018
	Rivets (Klinknagels)	44	2017
	Maintenance and repair of joints in historical brickwork (onderhoud en herstel van voegen in historische metselwerk)	27	2013
	Maintenance of iron components (Onderhoud van ijzerwerk)	32	2006
	Maintenance of wooden doors/windows (Onderhoud van houten buitenschrijnwerk)	32	2004
	Maintenance of steel doors/windows (Onderhoud van stalen schrijnwerk)	15	2001
	Façade finishing (Gevelafwerking)	22	1997
	Maintenance of floors	60	2012
	Maintenance of ceramic and cement tiled floors (Onderhoud van keramische en cementtegelvloeren)		
	Maintenance of wooden floors (Onderhoud van houten vloeren)	44	2008
Maintenance of natural stone floors (Onderhoud van natuursteenvloeren)	48	2007	

Table 1 (continued)

	Title	Page number	Year of publication
Animal, vegetation, and biological damages	Animals in and on buildings — insects (Dieren in en op gebouwen — insecten)	48	2010
	Animals in and on buildings — birds (Dieren in en op gebouwen — vogels)	40	2008
	Biological damages on wood (Biologische aantasting van hout)	32	2005
	Vegetation on and around buildings (Vegetatie op en rond gebouwen)	16	2004
	Maintenance of drainage and safe accessibility to high points of buildings	56	2018
	Safety and accessibility to attics, roof construction, roofs, and rainwater drainages (Veiligheid en toegankelijkheid van zolder, kapruimtes, daken en goten)	40	2009
	Maintenance of drainages (Onderhoud van hemelwaterafvoer)	68	2010
Maintenance of interior and movable heritage	Preservation and conservation of church textile (Kerkelijk textiel behouden en bewaren)	32	2006
	Maintenance of metal in the interior (Onderhoud van metaal in het interieur)	86	2001
	Manual for maintenance of the church interior (Schoon schip: handleiding voor het courant onderhoud van waardevolle kerkinterieur)		
Archaeological sites and other special types of heritage	Preservation and management of prehistoric burial mounds and urn fields (Behoud en beheer van prehistorische grafheuvels en urnenvelden)	2	2019

(continued on next page)

Table 1 (continued)

Title	Page	Year of publication
Preservation and management of mottes (Behoud en beheer van mottes)	2	2017
Archaeological value 2 of historic churches and their surroundings (De archeologische waarde van historische kerken en hun directe omgeving)	2	2016
Archaeological value 2 of castle domains (De archeologische waarde van kasteeldomeinen)	2	2016
Archaeological value 2 of historic abbeys and monasteries (De archeologische waarde van historische abdijen en kloosters)	2	2016

maintenance and preventive conservation in the field of built heritage. The Walloon Region established a similar organization in the early 1990s and was later incorporated into the Institut du Patrimoine Wallon, which founded the Cellule de maintenance in 2006 to promote daily maintenance and develop relevant policies and professional guidelines (Lipovec and Van Balen, 2008). For several years, the Walloon Region has promoted regular maintenance for protected heritage, including a maintenance grant up to 80% with a maximum of €22.000, to reduce restoration costs. The Brussels Region has no separate maintenance grant, and maintenance and restoration grants are subject to the same financial support system. Nevertheless, in all three regions, the authorities prefer a policy of preventive conservation and maintenance.

Following MOWA Flanders, which noticed craftsmen carrying out the recommendations on maintenance and small repairs to heritage buildings, some local institutions of traditional crafts training were established (e.g., European Center for Training and Crafts Perfection in Art and Historic Restoration) in Brugge. At the international level, within the platform of the PRECOM30S UNESCO Chair, MOWA Flanders promotes further the good practice in periodic inspection, proper maintenance, monitoring, and preventive conservation of built heritage, giving inspiration to other European countries to explore similar possibilities.

VOEGTYPES			
Doorgestroken voeg	De legmortel wordt doorgetrokken tot aan de rand. De overtollige mortel wordt weggenomen of over het metselwerk uitgestreken. Er wordt niet nagevoegd met een voegmortel.		
Platvolle voeg	De voegmortel wordt glad afgestreeken.		
Voeg met dagstreep	Bij onregelmatige of brede voegen werd een dagstreep getrokken om het metselwerk regelmatig te laten lijken.		
Holle voeg	De voegen werden gladgestreken met een bolle voegspijker.		Komt weinig voor in Vlaanderen.
Bolle voeg	Een holle voegspijker zorgt voor een bolle voeg.		
Verdiepte voeg	De legmortel wordt na het metselen diep uitgekrabd en al dan niet nagevoegd.		
Schaduwvoeg	De voegmortel wordt in delinvoegen schuin afgestreeken. Het water kan zo vlot aflopen en het horizontale karakter wordt benadrukt.		
Geknipte voeg	De uitpuilende voeg wordt boven- en onderaan schuin of recht afgesneden. De voeg wordt benadrukt.		
Gesneden voeg	Vergelijkbaar met de knipvoeg, maar dan gelegen in het gevelvlak.		

3.1. VOORBEREIDING

Voegen vrijmaken

Voegwerk uithalen is een delicaat werk. Als daarbij historische steenwerk beschadigd wordt, kan het karakter van de gevel onherroepelijk veranderen. Laat dit werk daarom bij voorkeur aan specialisten over, die de juiste werkwijze en het geschikte gereedschap kunnen gebruiken. Ideaal is een platte beitel, niet breder dan de helft van de uit te halen voeg. Een slijpschijf is niet aan te raden, behalve een kleine, met perslucht of elektrisch aangedreven slijpschijf om de spanning uit de voeg te halen. Daarbij wordt een zaagsnede gemaakt in het midden van de oude lintvoegen. Het beetje mortel dat aan de stenen blijft hechten, kan weggehaald worden met een steenbeitel. Een steen- en mortelzaag met aangepaste zaagbladen is een goed alternatief.

Het is immers essentieel dat alle verweerde mortel verwijderd wordt om een solide basis te verkrijgen voor de herstelmortel. Maak de voegen volledig tot in de hoeken vrij, zodat de restauratiemortel voldoende kan hechten aan de steen en de legmortel. Verwijder ook alle wortelresten en uitlopers van planten. Spoel de behandelde zones na met water om te verzekeren dat alle slechte en losse mortelresten weggehaald zijn. Zorg daarbij dat de gevel niet verzadigd raakt en dat de water- en persluchtstraal aangepast is aan de samenstelling van de steen. Werk steeds van boven naar beneden, zo wordt het restmateriaal weggespoeld. Soms is het nodig om losse stenen uit te halen en weer op te metselen.



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Fig. 10 A page of a brochure: Different forms of joints and repairing old joints © Monumentenwacht Flanders.

30 GEBUIWEN TOEGANKELIJK HOUDEN VOOR BESCHERMEDE OF GEWENSTE DIEREN	vogelsoort		Broedseizoen												
	Nederlandse benaming	Latijnse benaming	Illustratie	januari	februari	maart	april	mei	juni	juli	augustus	september	oktober	november	december
	zilvermeeuw	Larus argentatus		x											
	kleine mantelmeeuw	Larus graellsii		x											
	spreeuw	Sturnus vulgaris		x											
	huismus	Passer domesticus		x											
	zwarte roodstaart	Phoenicurus ochruros		x											
	kauw	Corvus monedula		x											eind maart-eind juli
	kraai	Corvus corone		x											
	kerkuil	Tyto alba		x											broedt in voedselrijke jaren 2 (soms 3)keer, kunnen het hele jaar door broeden (als er voldoende voedsel is)
	gierzwaluw	Apus apus		x											
	huiszwaluw	Delichon urbica		x											broeden 2à3 x/jaar
	boerenzwaluw	Hirundo rustica		x											broeden 2à3 x/jaar

broedseizoen ■ uitlopend broedseizoen in voedselrijke jaren ■ in het land ■ beperkte aanwezigheid ■

Fig. 11 A page of a brochure: Different types of birds and their activities in the whole year © Monumentenwacht Flanders.

3. Similar cases in Europe

3.1. Organizations and projects Following the Monumentenwacht model

The Dutch Monumentenwacht and Monumentenwacht Flanders, with decades of successful practice in periodic inspection and maintenance of built heritage, are known as the Monumentenwacht model, which is followed by various European countries.

Similar organizations have been established since 1999, such as Maintain our Heritage (MoH) in UK, DenkmalWacht (in Brandenburg und Berlin, Baden-Württemberg, Nordrhein-Westfalen, and Hessen) in Germany, Bygingsbevaring in Denmark, and Mamég in Hungary.

wikipedia.org

Projects with similar aims have been developed in different European countries. Examples are as follows:

- specific action plans for the periodic inspection of built heritage in the six Cultural District projects in Lombardy, launched by the Fondazione Cariplo in 2005;
- the five-year pilot project "Traditional Building Health Inspection Plan" in Stirling, initiated by Historic Scotland in 2013;
- the project "Pro Monumenta" by ICOMOS Slovakia since 2014;

- the three-year joint project "Heritage Care" launched by different research institutions in Portugal, Spain, and France in 2016 (Table 2).

3.2. Brief comparative analysis

Following the Monumentenwacht in the Netherlands, Monumentenwacht Flanders works with voluntary membership and encourages local caretakers' participation in the maintenance of built heritage, relying on the separate maintenance grants for monuments offered by the Flemish government and a subsidized financial structure with 85%–90% funding from the government and only 10%–15% funding from the membership and inspection fees. Thus, Monumentenwacht Flanders can provide inspection reports as "certificate" documents and other services at a low cost to help members obtain the maintenance grants and carry out proper maintenance.

Some organizations extend their services to gain more economical independence, such as Bygningsbevaring in Denmark, which provides lists of professional contractors for carrying out maintenance for built heritage and sometimes becomes involved in the maintenance projects.

Some organizations have been trying to change the strategic plans, adapting them to their social, economic, and political contexts. For example, MoH was established in

Table 2 Organizations and projects following the Monumentenwacht model in Europe © authors.

Start year	Country/region	Names of organizations/projects	Advantages/disadvantages
1973	The Netherlands	Monumentenwacht (organization)	the earliest and first practice
1991	Flanders, Belgium	Monumentenwacht Vlaanderen (organization)	a good organizational and financial model, not providing lists of contractors
1999	England, the UK	Maintain our Heritage (organization)	a specific marketing strategy for attracting users
1999, 2004	Germany	Denkmalwacht (Hessen, Brandenburg und Berlin, Baden-Württemberg, Nordrhein-Westfalen) (organization)	to be defined
2004	Denmark	Bygningsbevaring (organization)	provided lists of contractors
2005	Lombardy, Italy	Fondazione Cariplo/Cultural District (project)	developed a planned and preventive maintenance process for built heritage and incorporated the inspection work with Historic/Heritage Building Information Modeling (HBIM)
2006, 2012	Hungary	Mamég (2006) (organization), Múemlékőr (2012–2014) (project)	closed and finished
2013	Scotland and the UK	Traditional Buildings Health Check Scheme (project)	explored effective maintenance market for historic buildings
2014	Slovakia	Pro- Monumenta (project)	financial support from the national government
2016	Portugal, Spain, and France	HeritageCare (project)	incorporated with HBIM, Visual Reality (VR), and GIS to develop a digital-based integrated methodology

England in 1999 to develop the maintenance practice of historic buildings and prevent the need for larger restoration later. Regardless of the academic emphases on maintenance in history (Ruskin, 1849; Morris and Webb, 1877; Feilden, 1979, 1982), the development of MoH was not satisfactory initially due to the lack of government policy guidance and funding support. In 2002–2003, following the Monumentenwacht model, MoH started a pilot project in the Bath area to provide maintenance service for 72 listed heritage buildings. This pilot project was later stopped because of economic infeasibility given that the cost of each inspection fee was up to 1100 euro, which was much higher than the market price (Vandesande, 2017). In 2007, MoH initiated the Gutter Clearance Scheme in the Diocese of Gloucester, which provides gutter and roof inspection and clearance service for religious buildings. A specific marketing strategy was used to attract more users or owners to get involved in the scheme. With a cost-efficient maintenance process, the scheme was successfully operational, and other similar schemes are now operating in other English Dioceses (Wu, 2014; Vandesande, 2017).

When setting up organizations was difficult, some pilot projects were initiated with similar aims in specific municipalities or regions, usually in a broader framework. For example, the pilot project Múemlékőr in Municipality of Eger (Hungary) was implemented in the framework of the

project “HerMan-Cultural Heritage Management in the Central Europe Area”,¹⁶ and the Monumentenwacht practices in Italy were integrated into the Cultural District projects in the Lombardy Region (Moioli et al., 2018). Meanwhile, some other projects, such as Pro-Monumenta and HeritageCare, aim to establish organizations similar to the Dutch Monumentenwacht and Monumentenwacht Flanders in the future.

Most of these organizations/projects have followed the toolbox of methodologies on the monitoring and maintenance of built heritage and adopted the inspection reports system for owners/users with similar contents and layouts. Some (e.g., Cultural District in Lombardy) go further in the development of a planned and preventive maintenance process for built heritage (Cecchi and Gasparoli, 2012). Some (e.g., Cultural District and HeritageCare) attempt to incorporate the inspection work with HBIM, VR, and GIS to develop a digital-based integrated methodology for improving the maintenance process, monitoring, and preventive conservation of built heritage (Fonnet et al., 2017; Talon et al., 2017; Brito et al., 2019; Masciotta et al., 2019; Della Torre and Pili, 2019).

All those organizations and projects were started with a similar aim of promoting the proper maintenance and preventive conservation of built heritage. They all have confronted challenges in specific historic, economic, legal, and

¹⁶ The HerMan project was implemented between 2012 and 2014 through the Central Europe program led by the Municipality of Eger, in cooperation with eight other partners from Poland, Germany, and Italy. The Gyula Forster National Center for Cultural Heritage Management is one of the knowledge providers of the project and the professional coordinator of the Monumentenwacht/Múemlékőr pilot project. Latter pilot is aimed at exploring ways of introducing and adapting the Dutch “Monumentenwacht” method in Hungary.

political contexts. Among those organizations and projects, Mamég in Hungary was closed down, Múemlékőr was finished, and the rest are in progress. Further research and SWOT analysis on these cases are recommended to determine the most suitable way to adopt the Monumentenwacht model in different contexts. Monumentenwacht has developed an effective way of carrying out monitoring by regular inspection reports. As Monumentenwacht and new technologies continue to evolve, a new toolbox that combines existing monitoring and maintenance methods with digital tools (e.g., HBIM, VR, and GIS) should be explored in the future.

4. Conclusion

The experience of Monumentenwacht Flanders and other European countries has shown how to fit an imported organization into its own legal, political, and social context and make improvements at the same time. The organization structure and working mode of Monumentenwacht may be understood better based on an in-depth analysis. We can conclude the universal contributions of Monumentenwacht as follows:

1. The regular inspections, professional inspection report, database, and technical brochures provide professional references for the proper maintenance of built heritage.
2. The inspection reports act as professional manuals for owners/users to carry out proper maintenance and "certificate" documents to obtain maintenance grants from the government.
3. Monumentenwacht's bridging role among professionals, owners/users, and government officials has raised owners and caretakers' awareness of the importance of proper maintenance (through the inspection reports, illustrated brochures, and other services), promoting a bottom-up approach, which is essential to the preventive conservation of immovable cultural heritage.
4. Monumentenwacht Flanders' main funding comes from the government. However, it always insists on providing independent services to members, and its membership and inspection fees are lower than the market price, which are the main reasons why they can have loyal members.

The Monumentenwacht model has been adopted by various European countries, especially for inspections and the reporting system. While facing challenges during the adaptation, most of them attempt to explore the most suitable ways to fit it into the existing conservation management system while considering the local traditions and specific cultural, social, economic, legal, and political contexts. The Monumentenwacht model, as a good example to promote proper maintenance with high quality, raises awareness among owners and caretakers and thus encourages public participation in conservation, which, if combined with digital tools, such as HBIM, VR, and GIS, will improve the maintenance process and the efficient management of the whole conservation process and promote the implementation of preventive conservation strategies and activities for built heritage.

Conflict of interest

The authors declare that there is no conflict of interest.

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