

Saint Salvator Abbey and vicinity in Ename around 1065: Visual Dimension, CC-BY-NC-SA



Europeana Case Study

Using 3D Reconstruction and Storytelling to bring the past to life

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Introduction

The potential of using 3D digitisation of historic buildings, monuments, sites and collections for tourism, education and exploration is well recognised. This case study shares insights from a long-running project at Ename in Belgium on how to realise the full potential. It is written for cultural heritage institutions considering 3D digitisation projects.

[Visual Dimension](#), a founding member of the [CARARE association](#), has worked with the Provincial Archaeological Museum and the Provincial Heritage Centre of Ename for several years on the study and digital reconstruction of the local heritage.

Visual Dimension is a Belgium-based SME active in architecture and digital cultural heritage. The company specialises in the interpretation and virtual reconstruction of historical sites, landscapes and objects and in digital restoration and virtual re-contextualisation of museum objects through interactive storytelling. Ename is a village in north west Belgium with an archaeological park and museum focussing on the abbey complex and the evolution of the village.

3D technologies have been used to digitise and reconstruct Ename Abbey and its surroundings as it evolved over several centuries. In order to create the reconstructions, Visual Dimension researches the sources needed to provide historically accurate representations. Resources such as books, drawings, paintings, museum objects and excavation records help to construct a meaningful picture of the Abbey and its inhabitants. Visual Dimension compares sources with each other in detail to define hypotheses for the virtual reconstruction to be made (source correlation as defined in the London Charter). Story-telling techniques are then used to enable visitors and students to interact with important objects and books belonging to the Abbey in meaningful ways.

The results of this collaboration include a series of digital outputs including a Virtual Reality Application and Serious Games made available on-site. 3D printed models of important objects for exhibitions and educational visits. In addition, open licencing of the content has allowed a set of 3D models and images to be published on-line and made accessible via Europeana.



Do your research

In order to create authentic digital stories, it is important to **research the history** of the site and to **identify sources** that you will need for the reconstruction. In the case of Ename information was available through the Provincial Archaeological Museum and Heritage Centre, in the collections of other cultural heritage institutions and through publications such as excavation reports. Researching the history helps both to inform the reconstruction and to identify topics that can be brought out in the stories, and the possible learning outcomes for different age groups.

Ename Abbey was founded in 1063 by Benedictine monks and survived until the 18th century and has a fascinating history.

In 1065 Ename was a small, rural settlement adjacent to the remains of a failed trade settlement, constructed within the oxbow of a river. The abbey complex was constructed around the Saint Salvator church of the trade settlement, on the outskirts of the village. Between 1150 and 1200, the Abbey grew significantly, a new church was built and other buildings were renovated. Over the next century a hospital and an infirmary (for the monks) were added. In 1300 the [Abbey dominated the landscape](#), owning a large number of properties. Disaster struck in 1578 when [Protestant troops plundered the Abbey](#) during the occupation of Oudenaarde. The monks fled, only returning in 1596 to start rebuilding the Abbey. During the [17th and 18th century, the Abbey prospered](#) with further additions such as a carillon tower and a French [garden with fountains and an orangery](#), until 1795 when the French Revolution resulted in the dissolution of the Abbey.

After the dissolution the monastery buildings were dismantled and sold for building materials, objects and possessions were also sold. The Saint Laurentius church survived as the parish church of the village of Ename.

Research into the Abbey began in 1895, when the then mayor of Ename, Edmond Beaucarne, published the historical sources of Ename. Between 1942 and 1947 excavations were carried out of the archaeological site by Professor Van de Walle. A second campaign, under the direction of the Belgian National Service for Excavations, ran from 1982 to 2002 during which the castrum, abbey and settlement site were investigated. The church of Saint Laurentius was also excavated as part of a restoration project from 1999 to 2002. In addition, the area around Ename has been the subject of a long-running project investigating the evolution of the landscape and its ecology¹.

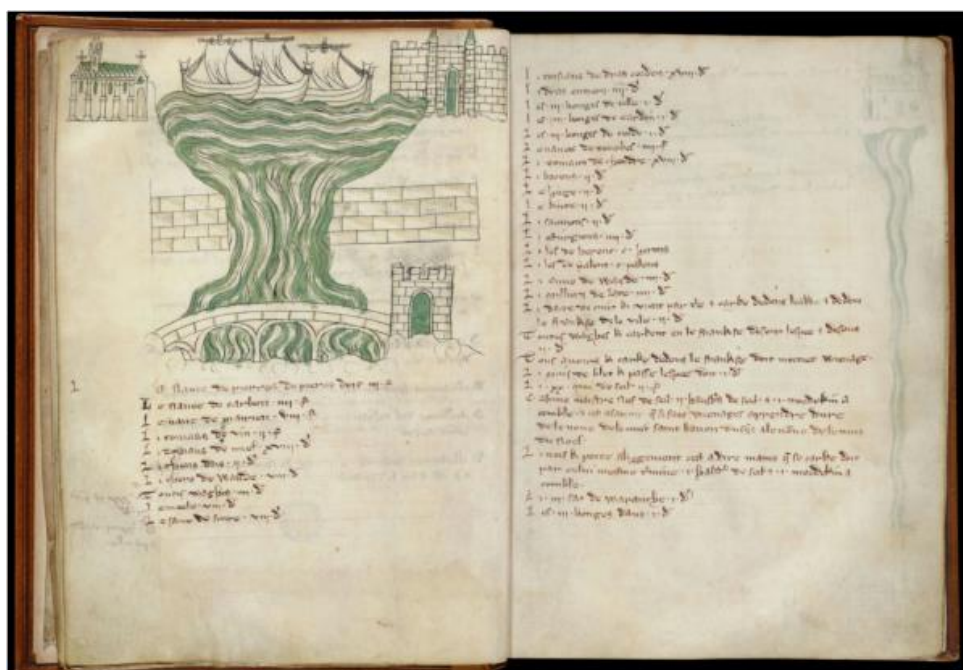
¹ <https://en.wikipedia.org/wiki/Ename#Archaeology>



Excavations at the Ename Abbey archaeological Site in the 1990s.

Photographer: Paul M.R. Maeyaert CC-BY-SA 4.0

Today, as well as the remains visible in the archaeological site and the nearby museum, and historic buildings within the village, several rare books and other artefacts from the abbey are preserved in museums and archives. These items include two rare books - an educational book and a medieval rent book (the Veil Rentier).



Extract showing the harbour. Veil Rentier. Royal Library of Belgium, All Rights Reserved: [online](#).

Other sources which provide information about life in the Abbey, its farms and the village include works of art from the period and related items in museum collections.



Digitisation programmes by cultural heritage institutions have resulted in many outstanding medieval manuscripts being made accessible in a digital way. National libraries such as [Bibliothèque nationale de France \(BnF\)](#), the [British Library](#) and the [Royal Library of Belgium](#) have all digitised manuscripts, while museums and galleries, such as the [Rijksmuseum](#), have digitised artworks and objects, which have all been important for Visual Dimension's research.

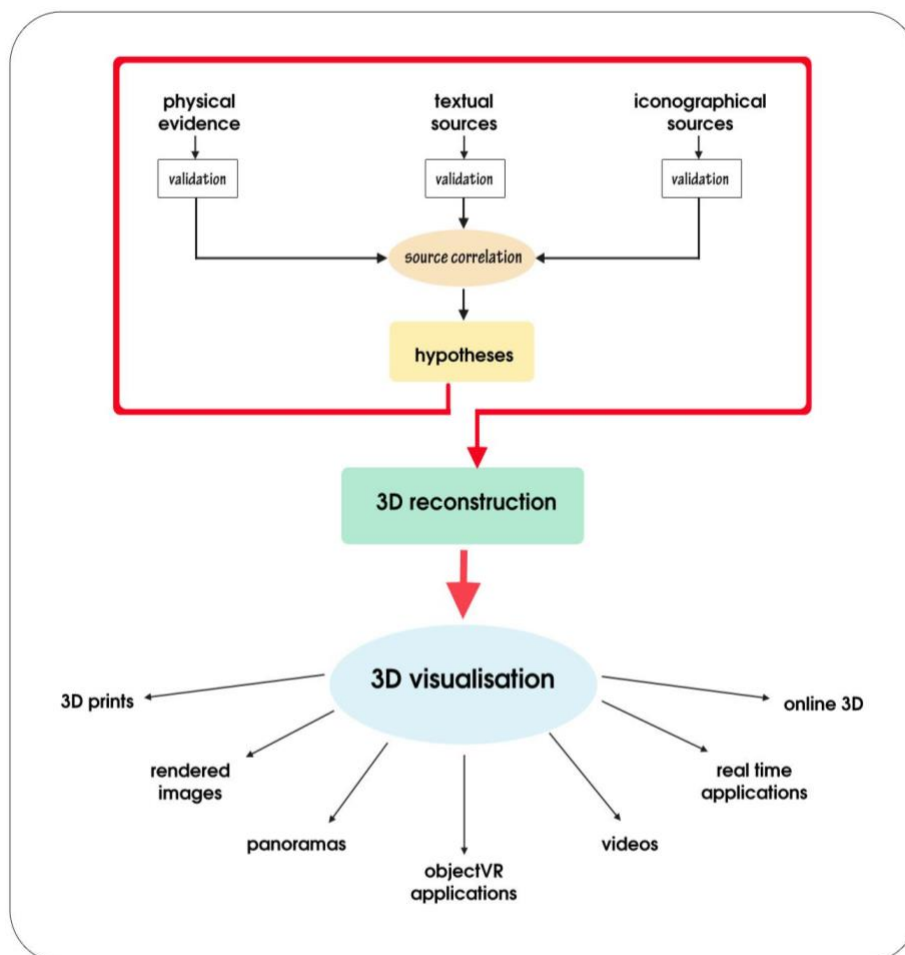
The sharing of such data with Europeana provides a valuable research resource.



How the 3D project was conceived and executed

Visual Dimension was originally commissioned by the Provincial Archaeological Museum and Heritage Centre to create a 3D reconstruction of the Abbey and the village as it had looked at various times during its development.

Visual Dimension's approach is to use a range of technologies combined with research to come to scientifically correct interpretations and representations. The 3D virtual reconstruction process of Ename Abbey and its landscape begins with an assessment of the physical evidence (the building remains), the textual and iconographic sources to visualise scenes within the abbey and its surroundings. This enables a process of digital restoration and re-contextualisation of the buildings and museum objects in 3D models, which are then used to produce a range of applications.



Methodology. Visual Dimension bvba , CC BY-NC-SA 4.0

The original commission for the Provincial Archaeological Museum and Heritage Centre produced a [3D TimeLine](#) that shows changes to the site [over the time period 1015 to](#)



[1795](#). This timeline can be seen in both the museum, in the Saint Laurentius church and on the archaeological site.



Ename TimeLine in the Saint Laurentius church of Ename (from a [YouTube video](#))
Visual Dimension bvba , CC BY-NC-SA 4.0

For two periods ([1291](#) and [1665](#)), these reconstructions were turned into 3D virtual worlds that can be explored interactively like a video game. The virtual worlds contain reconstructions of interiors and the objects that would have been seen in those spaces, and also characters and animals.



A character in the 1291 game
Visual Dimension bvba , CC BY-NC-SA 4.0



Spaces in the medieval Abbey, such as the Scriptorium where books were made and written by the monks, have been recreated. In the 17th century reconstruction of Ename, [interiors](#) of village houses have been reconstructed and include relevant everyday objects. Within the entrance building of the abbey there is a pharmacy and doctor's consultation room, and the abbey tower has a clock and [35 bell carillon](#), which is played automatically by a large drum mechanism or manually by a virtual monk.

Visualising the Heritage

Information drawn from archaeological remains, environmental evidence and historical sources is a well-established part of the research method used to visualise and reconstruct scenes from the past. Excavation plans allow the footprint and layout of a building to be understood. Depictions, such as the one of Ename Abbey in the Veil Rentier, allow the buildings to be visualised.



The oldest depiction of the Ename Abbey from the Veil Rentier (rent book) of 1265.

Royal Library of Belgium, All Rights Reserved

Drawings and paintings depicting the abbey and interiors of the period were used to inform the reconstructions enabling details of room interiors, gardens and other settings to be included. For example, a 1649 painting of a river landscape with a ferry by Salomon van Ruysdael (made available by the Rijksmuseum on Europeana, see below) helped inform the depiction of a ferry in the Ename Virtual Reality model.



[River Landscape with Ferry, 1649, Salomon van Ruysdael](#)

Rijksmuseum, Public Domain



Model of ferry boat in Ename virtual reconstruction

Visual Dimension CC-BY-NC-SA

The Veil Rentier documented the watermill at Ename Abbey and provided simple drawings of the mill, people working in the fields and a horse and cart. Additional sources including depictions of watermills in medieval manuscripts, drawings of watermills in the 17th century (for example see below) and an experimental archaeology project at Guédelon in France all helped to inform the 3D model of the mill and its animation.



[Watermolen, Cornelis Saftleven, 1617-1681](#)

Rijksmuseum, Public Domain



Animated medieval watermill
Visual Dimension CC-BY-NC-SA

Many of the scenes include movable objects - tables, chairs, mugs, glasses, barrels and so on. Each of these items has been captured in 3D. In some cases, objects originally from Ename found in museums and archives have been digitised and included in the appropriate scene. Other scenes include 3D models of typical objects of the period which have been identified through research.



The results of the project

The collaboration between Visual Dimension and the Provincial Archaeological Museum and the Provincial Heritage Centre of Enne, which has run for several years, has resulted in a series of digital outputs including Virtual Reality Applications, Serious Games, 3D printed objects for exhibitions and educational visits and individual 3D models. Agreement to openly licence the content has allowed Visual Dimension to publish a set of 3D models and images on-line and make these accessible via CARARE to Europeana.

Virtual tours

A major outcome of the 3D project has been the creation of an interactive storytelling tool that is used onsite by guides and museum visitors. Guides can give a virtual tour through the medieval abbey and village and tell their own story based upon the parts of the reconstruction that they are showing. Museum visitors can explore the virtual village and abbey and get short, interconnected stories each time they pick up an object.

For example, the virtual reconstruction of the medieval scriptorium of the Enne Abbey is used to provide a 'visual story' about medieval book making and all the stages of the process. A large-screen projection of the image allows people to interactively explore the scriptorium through [Timegate](#) (a serious game environment) and use gestures or a games controller to interact with and navigate the virtual world.



The scriptorium of the Enne Abbey in 1290. Visual Dimension bvba , CC BY-NC-SA 4.0



The reconstruction of the scriptorium allows visitors to access two Flemish Masterpieces. The first is an educational book - you can see a page being written on the writing desk. The page, which is in medieval Dutch, can be read in the reconstruction. If people point at the page, they can hear a translation in modern Dutch. The author (who was a monk in the abbey) spells out his own name twice and explains that it took him quite an effort to write the full book, which is in both Dutch and Latin.

The second Masterpiece is a medieval rent book (the Veil Rentier), which documents the properties of the lord of Oudenaarde (city next to Ename) in 1275. The [rent book](#) is on the writing table as some additions and corrections are being made. This book teaches you a lot about medieval society, from how a harbour functions, how politics are involved when there is a bill to be paid, and the many taxes that were applied. The book contains nearly 400 drawings that show daily life of the 13th century, some of which are quite unique - for example the oldest known depictions of a windmill.

Educational games

Guides at the Ename Museum also have access to games for use with school groups.

In the [1290 game](#), users land their Time machine in Ename during Pentecost to visit the abbot, but things go awfully wrong. They have to start a quest to find [lost keys](#) to come to a happy end - but they can also end up at the [pillory](#), being chased by [fierce goose](#) or even drown in the river. Historical characters feature in this game including Martijn van Torhout (a monk and scribe at the abbey scriptorium), Jan and Arnulf van Oudenaarde (lords of Oudenaarde) and Gerard van Strijpen (the abbot of the Ename abbey).



Interacting with the Ename 1290 game, Visual Dimension bvba , CC BY-NC-SA 4.0

The [Eham 1291 game](#), for children of 10-12 years, focuses on an [ivory crosier](#) on display in the Ename museum. The crosier was broken at some time in the past and the game is



a quest for the keys of a box in which it was brought back from the goldsmith who repaired it. The crosier was restored digitally to be used in the game. This work also enabled it to be 3D printed for use in exhibitions and the museum's educational programme.

Another game explores [Ename in 1665](#).



3D printed replica of the ivory crosier from Ename Museum
Visual Dimension bvba , CC BY-NC-SA 4.0



3D reconstruction of the crosier
Visual Dimension bvba, CC BY-NC-SA 4.0



Ename on Europeana

Much of the content which was produced by Visual Dimension for the Provincial Archaeological Museum and the Heritage Centre has been made accessible on Europeana via CARARE and the 3D-ICONS project.

ename - Search

COLLECTIONS YOU MIGHT LIKE

Vitreous enamel

Institution: Visual Dimension bvba

Collection ▾ Type of media ▾ Can I use this? ▾ Providing country ▾ More filters +1 RESET

Results: 127

| | | | |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| | | | |
| Saint Salvator abbey and vicinity in Ename around 1730 Visual Dimension bvba Visual Dimension bvba | Saint Salvator abbey and vicinity in Ename around 1595 Visual Dimension bvba Visual Dimension bvba | Saint Salvator abbey and vicinity in Ename around 1065 Visual Dimension bvba Visual Dimension bvba | Evolution of the Saint Salvator abbey of Ename (1065-1730) Visual Dimension bvba Visual Dimension bvba |
| | | | |
| Evolution of the Saint Laurentius church of Ename (1015-1780) | Saint Laurentius church of Ename around 1665 Visual Dimension bvba | Saint Salvator abbey and vicinity in Ename around 1150 | Saint Laurentius church and vicinity in Ename around 1150 |

[Content for Ename from Visual Dimension on Europeana](#)



ename - Search









COLLECTIONS YOU MIGHT LIKE

Vitreous enamel

Institution: visualdimension

Collection ▾ Type of media ▾ Can I use this? ▾ Providing country ▾ More filters · 1 RESET

Results: 13

| | | | |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>Ename Crosier - original state visualdimension visualdimension</p> |  <p>The Ename Swan Inn - 17th century visualdimension visualdimension</p> |  <p>Ename Crosier - repaired state visualdimension visualdimension</p> |  <p>Rural brewery - 17th century visualdimension visualdimension</p> |
|  <p>Animated medieval watermill visualdimension</p> |  <p>Market cross - 17th century visualdimension visualdimension</p> |  <p>Rural school - 17th century visualdimension visualdimension</p> |  <p>Pillory - 17th century visualdimension visualdimension</p> |

[3D reconstructions of objects and buildings on Europeana](#)

The content includes versions of the 3D reconstructions which have been uploaded by Visual Dimension to Sketchfab to enable online access for users, as well as a collection of images of the restoration of Saint Laurentius church in Ename.



ename - Search

COLLECTIONS YOU MIGHT LIKE

Vitreous enamel

Institution: Visual Dimension bvba Type of media: Image

Collection ▾ Type of media ▾ Can I use this? ▾ Providing country ▾ More filters · 1 RESET

Results: 30

Restoration of the Saint Laurentius church, Ename (Belgium) - east choir inside 17
Visual Dimension bvba
Visual Dimension bvba

Restoration of the Saint Laurentius church, Ename (Belgium) - east choir inside 09
Visual Dimension bvba
Visual Dimension bvba

Restoration of the Saint Laurentius church, Ename (Belgium) - east choir inside 04
Visual Dimension bvba
Visual Dimension bvba

Restoration of the Saint Laurentius church, Ename (Belgium) - east choir inside 14
Visual Dimension bvba
Visual Dimension bvba

[Images of the restoration of Saint Laurentius church in Ename on Europeana](#)

Other resources on Europeana

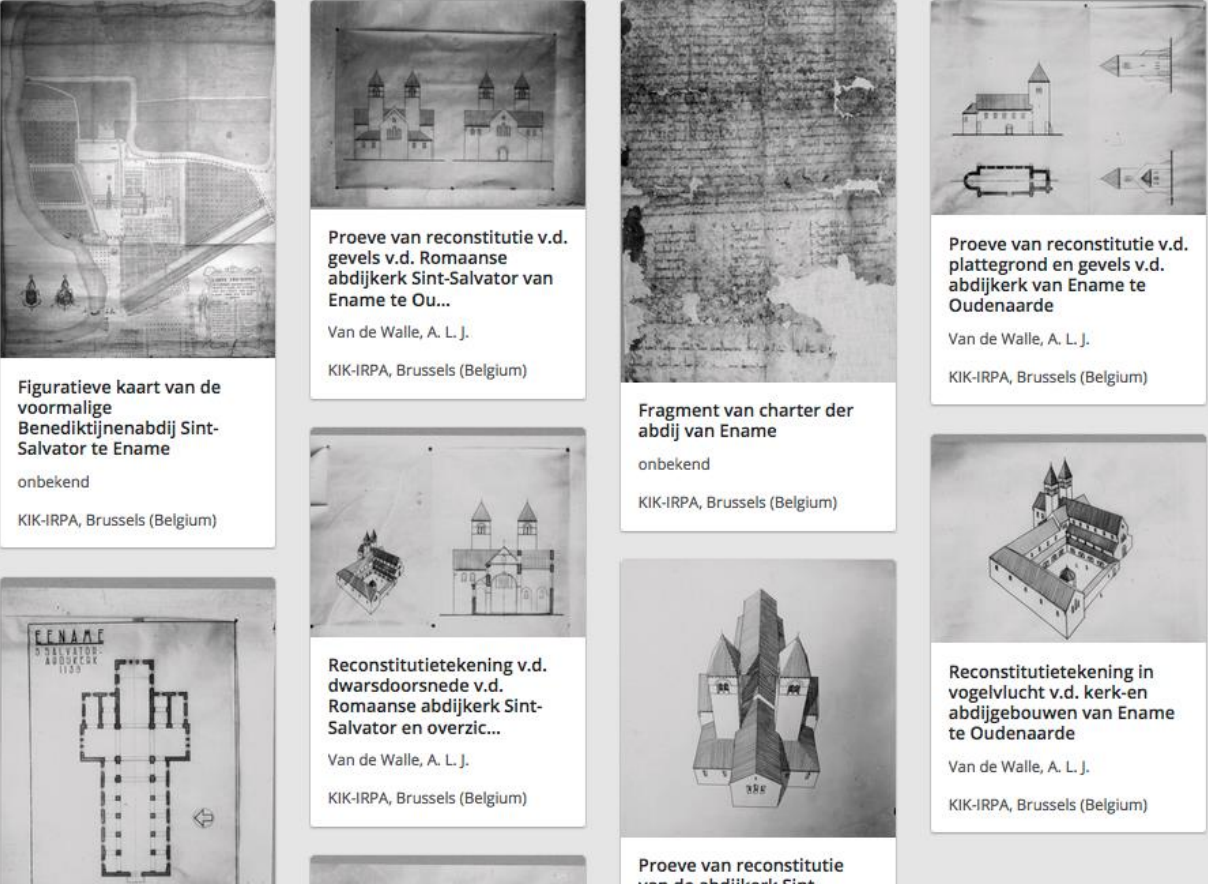
In addition Europeana's users can find digital resources relating to Ename from a number of other institutions and individual photographers. These include:

- a collection of photos preserved in the KIK-IRPA (Belgium's Royal Institute for Cultural Heritage) of [reconstructions of the archaeological site produced in the 1940s by Van de Walle](#) (director of the 1942-1947 excavations).
- A collection of images of [objects and buildings in and around Ename taken by a local photographer, Paul Maeyaert](#), and also aggregated by CARARE.
- A [reference to a catalogue of books in the library of Ename Abbey](#) at the end of the 18th century held by the University of Ghent.

Institution: KIK-IRPA, Brussels (Belgium)

Collection ▾ Type of media ▾ Can I use this? ▾ Providing country ▾ More filters · 1 RESET

Results: 11



Figuratieve kaart van de voormalige Benediktijnenabdij Sint-Salvator te Ename
onbekend
KIK-IRPA, Brussels (Belgium)

Proeve van reconstitutie v.d. gevels v.d. Romaanse abdijkerk Sint-Salvator van Ename te Oudenaarde
Van de Walle, A. L. J.
KIK-IRPA, Brussels (Belgium)

Fragment van charter der abdij van Ename
onbekend
KIK-IRPA, Brussels (Belgium)

Proeve van reconstitutie v.d. plattegrond en gevels v.d. abdijkerk van Ename te Oudenaarde
Van de Walle, A. L. J.
KIK-IRPA, Brussels (Belgium)

Reconstitutietekening v.d. dwarsdoorsnede v.d. Romaanse abdijkerk Sint-Salvator en overzic...
Van de Walle, A. L. J.
KIK-IRPA, Brussels (Belgium)

Reconstitutietekening in vogelvlucht v.d. kerk-en abdijgebouwen van Ename te Oudenaarde
Van de Walle, A. L. J.
KIK-IRPA, Brussels (Belgium)

Proeve van reconstitutie van de abdijkerk Sint...

[Reconstructions of the Ename archaeological site produced in the 1940s by Van de Walle](#)
a collection of photos preserved in the KIK-IRPA



PM 129945 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



PM 122994 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



PM 041042 B Oudenaarde

Paul M.R. Maeyaert

PMRMaeyaert



PM 129946 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



PM 122997 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



PM 130002 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



PM 129959 B Ename

Paul M.R. Maeyaert

PMRMaeyaert



[Images of objects and buildings from Ename and the surrounding area taken by Paul Maeyaert](#)



Conclusion

Visual Dimension's long-running collaboration with the Provincial Archaeological Museum and the Provincial Heritage Centre of Ename to research Ename abbey and its surroundings have resulted in the creation of high-quality 3D reconstructions. The Virtual Reality applications and serious games produced from this work are enabling the museum to tell the story of the Abbey, its inhabitants and the nearby village in a meaningful way. Engaging content is available for visitors to the museum and for guides to educate, inform and offer enjoyable experiences to visitors, adults and children alike. Visitors can interact with masterpieces such as the Rent Book and the Ename Crosier virtually (or as 3D printed objects) without fear of damage and with the ability to understand the medieval text.

Importantly, open licencing of the content has allowed a set of 3D models and images to be published on-line and made accessible via Europeana. This content sits in Europeana alongside other sources for Ename and about life in the region from the 11th to 17th centuries. This project shows the full potential of using digitised cultural heritage assets to inform 3D reconstructions and in storytelling to bring the past to life.



Further reading

Ename, Wikipedia: <https://en.wikipedia.org/wiki/Ename>

Ename Abbey, Wikipedia: https://en.wikipedia.org/wiki/Ename_Abbey

Erfgoed site Ename website (in Flemish): <http://www.pam-ov.be/ename>

Visual Dimension, Pam Ename project:

http://heritage.visualdimension.be/exhibitions/pages/pam_ename.html

Visualisation of the Benedictine abbey of Ename, Visual Dimension blog:

<https://enameabbey.wordpress.com/>

Veil Rentier, online at the Royal Library of Brussels:

<https://opac.kbr.be/LIBRARY/doc/SYRACUSE/15235678>

Basic principles and tips for 3D digitisation of cultural heritage, 2020, European Commission expert group on Digital Cultural Heritage and Europeana, online:

<https://digital-strategy.ec.europa.eu/en/library/basic-principles-and-tips-3d-digitisation-cultural-heritage>

Introduction to the 3D workflow, 2019, Share3D, online: <https://carare.gitbook.io/share-3d-guidelines/3d-process/context>

London Charter for the computer-based visualisation of cultural heritage, 2012,

<https://www.londoncharter.org/introduction.html>



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