

Digitalisation  
and promotion  
of digitalised heritage  
via New Media

# Second life

BEST PRACTICE EXCHANGE  
BETWEEN MUSEUMS FROM  
LIECHTENSTEIN, NORWAY  
AND POLAND

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# Introduction

“Second life. Digitalisation and promotion of digitalised heritage via New Media – best practice exchange between museums from Liechtenstein, Norway and Poland”

## In lieu of foreword

The digitalisation of works of art and historical artefacts is being carried out in museums all over the world and involves the use of considerable public funds spent on this purpose. Yet the importance and necessity of digitalising cultural objects is indisputable.

While we are aware of the potential of digitized images in promoting the culture of a country or region, and the significant role they could play – if properly displayed – in attracting visitors and tourists, we realize that the public does not take advantage of them as frequently as museum experts, municipal authorities and tour operators would wish.

This was the origin of the idea for the project “**Second life. Digitalisation and promotion of digitalised cultural heritage via New Media**”, which was aimed at exchanging best practices in digitalisation and promoting digital images, as well as providing these images with “second life” by unlocking the tremendous potential offered in this area by modern technologies and social media.

The Project participants included experts from the National Museum in Krakow, the Bergen City Museum, and the National Museum in Liechtenstein, as well as specialists and employees of cultural and academic institutions from Liechtenstein, Norway and Poland.

The results of our work are presented in this brochure. We sincerely hope that it will become an inspiration for promoting digitalised cultural resources, as although heritage is an expression of creative endeavours of past generations and documents the past, it was created for the future in order to serve it.

Yours,

“Second Life” Project Team

Nadine Székely, Rainer Vollkommer

# Digitalization of the Museum — the Example of the Liechtenstein National Museum

A report on conducted projects and visions of the future by Dr. Nadine Székely, accompanied by comments of Prof. Dr Vollkommer, Director of the Liechtenstein National Museum

For several years, the Liechtenstein National Museum has been engaged in digitalization and experiments with the different possibilities of digital technologies and has tried to see which of them can bring advantages to the museum. Prof. Dr Vollkommer, Director of the Liechtenstein National Museum sees that our society is living now in the digital age and thus, the museum has to face these challenges and opportunities: *“As a service provider, we also want to try to use these new technologies, so that the visitor may be given information, not only in the traditional way, but also using digital possibilities. Hence digitalization is very important to me.”* Due to age structures in museums, many decision makers in these institutions were born and raised before the digital age and therefore many museums are slow in adopting these new technologies. The Liechtenstein National Museum has the great advantage that many employees are young and thus used to digital technologies. Consequently, the museum is preparing for the digital age visitor, who is assumed to be accompanied by his smartphone or Ipad. As the first step, wireless internet was installed in the museum building; however, this is only a minor step in the museum's efforts in engaging with digitalization.

- **A typical museum visitor – already ready for digitalization?**

As already mentioned before, the age distribution among the museum's employees partly hinders digitalization of the museums. That brings up the question, whether a typical museum visitor is prepared for digitalized museum. However, the director of the Liechtenstein National Museum does not worry about this:

*“I think this is a development; ten, twenty years ago, there were hardly any “elderly people”, from 60 onwards, who had dealt with new technologies. Nowadays, there are more and more elderly people who use social media like Facebook. There is also a development in using new technologies by older people.*

*Furthermore, museums are dealing with several subgroups of people. Children and youth form the most important subgroup. They are born as digital natives and use the new media and technologies without any problems. Then there is often a gap in visitors to the museums. It is the age between 20 and 40 years old. They have to work, enter a new world, study, have different priorities and thus are seldom visitors. Then comes the first wave – from the age of 40 to 60 – with again increasing visitor numbers, and then there is another high number of visitors from 60 years old onwards. Nowadays, you still have to handle these visitors of different age, knowledge and interest in the new technologies. But in a few years, most of them will be familiar with digitalization and it will become the strongest instrument for museums.”*

- **Digitalization – one word, many potential applications**

Prof. Dr Vollkommer sees several areas in which digitalization can be integrated in the museum, starting with the museum itself: *“First we could use simple technologies like beamers and flat screens, to provide much more information.”* But providing information is only the first step, he could also imagine including game elements, for instance, that questions could be answered digitally by the audience, or stories could be told by applications on smartphones or laptops. This way, the visitor can decide on how long and to which stories he wants to listen. Thus, the museum *“can offer much more information without forcing him [the*

*visitor] to read all the written information”* as Prof. Dr Vollkommer describes one of the advantages of digital story telling.

Providing information digitally has another great advantage for the Liechtenstein National Museum. The visitors of the Museum are very international. Currently, there is always a trade-off in deciding in how much language information is presented in the exhibitions. Consequently, Prof. Dr Vollkommer plans that *“the exhibition would only be available in one or two languages, perhaps for example German and English, and then in an ideal situation – as we have many Asian visitors – a Chinese visitor could get the same information in Chinese on his smartphone.”*

However, providing enhanced information is not the only application area of digitalization in a museum. Prof. Dr Vollkommer imagines the establishment of digital exhibitions including an exchange of artefacts with other museums in a digital way, resulting in *“exhibitions, which we [the museum] either show traditionally in rooms or even just on the Internet.”* In the following part, some of the projects as well as ideas for future projects are presented.

- **Enhancing exhibitions through digital technologies – augmented reality applied**

One project that the Liechtenstein National Museum engaged in together with the University of Liechtenstein was aimed at providing additional information in an exhibition through digital technology. More specifically, augmented reality was used to provide additional information in an exhibition on mathematics.

Augmented reality places virtual objects in real world, and thus supplements reality (Azuma, 1997). At the Liechtenstein National Museum, a mathematics exhibition was enhanced by such virtual objects and an experiment was conducted to explore the effect of augmented reality on the learning performance of exhibition visitors.

In total, 101 participants took part in the experiment. They were split up into two groups and for each group six exhibits were augmented. See Table for an overview of the exhibits and the corresponding augmented reality experiences and Figure for some examples.

Exhibit	Group	Exhibit and topic	Augmented reality experience
1	1	Interactive model of a cycloid constructed of a three-lane marble track	Video in which the curator explains and illustrates that a cycloid has the properties of a tautochrone curve
2	1	Interactive model of a cycloid constructed of a three-lane marble track	Video in which the curator explains and illustrates that a cycloid has the properties of a brachistochrone curve
3	2	Interactive model of a hyperboloid constructed of strings	Video in which the curator explains why the cooling towers of nuclear power plants are constructed in the form of hyperboloids
4	2	Interactive model of a hyperboloid that is used for plugs in aircrafts; real aircraft plugs	Video in which the curator explains why a hyperboloid form guarantees full galvanic isolation of plugs
5	1	Interactive model of a double cone on a diverging monorail	Video in which the curator shows that a double cone on a diverging monorail seemingly rolls upwards
6	2	Explanation of the approximation of Pi in an annexed book and on exercise sheets	Video in which the curator explains how to approximate Pi by tying a rope around the earth's equator
7	2	Physical models of a cube and the various nets of its surface	Animation showing the unfolding of all different nets of a cube's surface (Fig. 1)
8	1	Interactive installation illustrating the attributes of a plain mirror; additional descriptions on exercise sheets	Video in which the curator illustrates the correlation between distance and height of the objects in the mirror
9	1	Illustration of linear and exponential growth through an interactive paper folding experiment and a representation of an exponentially growing number series on the steps of the entrance hall's stairs	Animation illustrating the exponential growth through the wheat and chessboard problem (Fig. 1)
10	2	The Monty Hall problem explained in book in the exhibition's reader's corner	Animation explaining the Monty Hall paradox
11	1	Fully functional exemplar of the Arithmometre mechanical calculator from Thomas de Colmar in a glass cabinet	Video in which the curator explains and demonstrates the functionalities of the Arithmometre calculator
12	2	Fully functional exemplar of the Heureka mechanical calculator in a glass cabinet	Video in which the curator explains and demonstrates the functionalities of the Heureka calculator

Table. Exhibits and Augmented Reality (Sommerauer & Müller, 2014, p. 61)

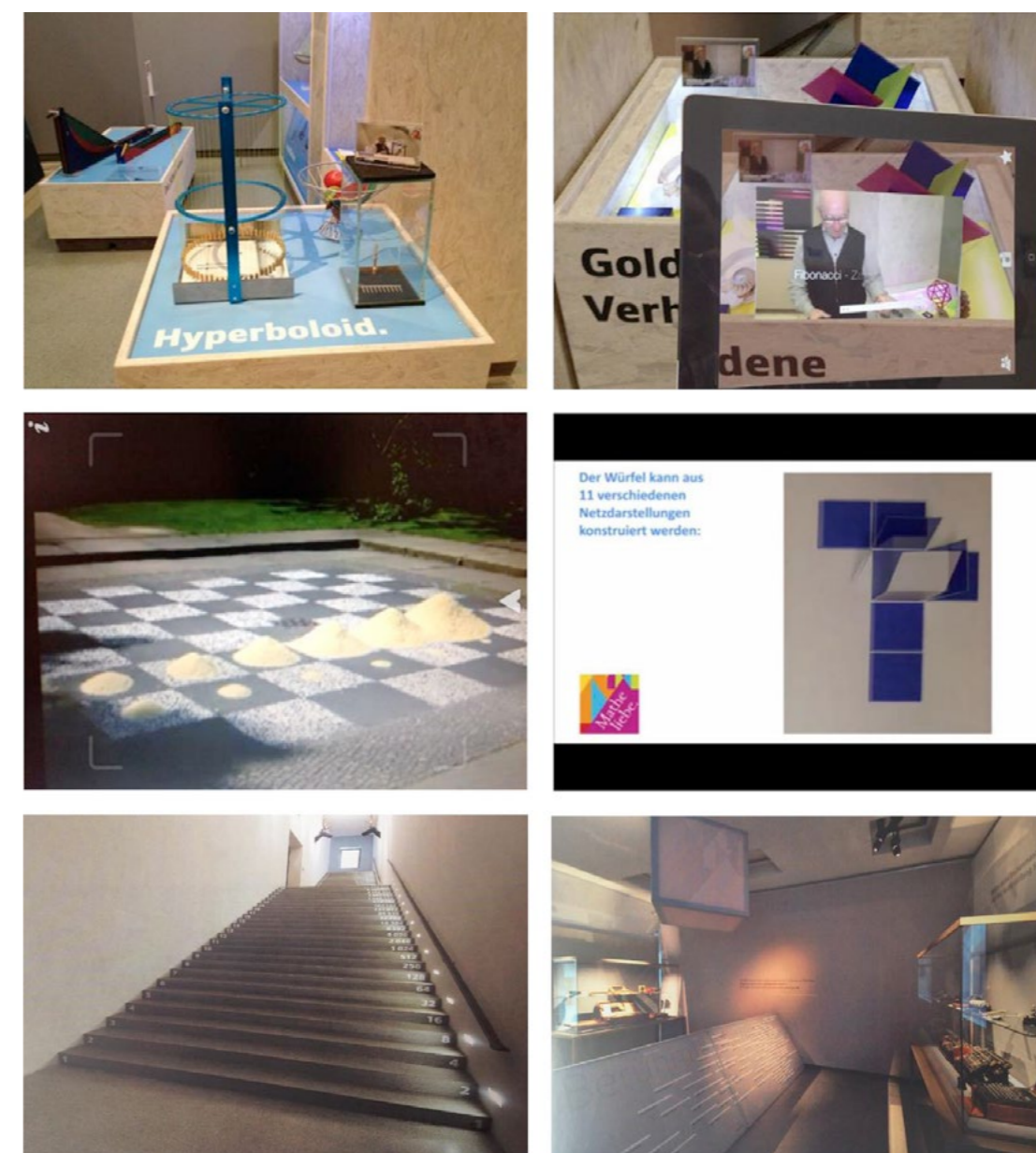


Figure. Interactive exhibits of hyperboloids (top left); AR experiences (top right: video in which the curator demonstrates an exhibit, middle: two animations illustrating mathematical problems); Illustration of exponential growth on the stairs of the entrance hall (bottom left); Historical calculators in glass cabinets (bottom right) (Sommerauer & Müller, 2014, p. 63)

In order to evaluate the effect of augmented reality on the visitor's learning performance, participants' knowledge on the twelve exhibits was tested before and after visiting the exhibition. The score differences showed the knowledge gain after visiting the exhibition. In a further analysis, the knowledge gain for exhibits which were enhanced with augmented reality was compared with the knowledge gain for those exhibits which the visitor only saw in the traditional way. The

analysis provided evidence that indeed augmented reality leads to a significant improvement in learning performance. Further, visitors reported that augmented reality experience was a valuable add-on to the exhibition and that they would like to see augmented reality in the museums.

Further information on the project as well as the underlying experiment can be found in the following article:

Sommerauer, P., & Müller, O. (2014). Augmented reality in informal learning environments: A field experiment in a mathematics exhibition. *Computers & Education*, 79, 59–68.

For Prof. Dr Vollkommer this project was a full success:

*“It was a great experience, because it was relatively early in relation to the museum world, at least in Central Europe, and it was a great experience to see that in this mathematics exhibition you have certain objects that you could also see through augmented reality, for instance three-dimensionally, in movement, or from different angles. Then there is a great advantage that someone who really has the know-how, a teacher or someone who knows a lot about this object, could talk about it. And this model was, so to speak, very stimulating and actually you should do much more in this direction. At the same time, one has already seen where the borders are. You must be aware that even, let's say, 30 seconds on an object is very time-consuming – to prepare the set-up but also to design a summary that is good for the viewer. But it was a good experience to have. Yes, great, we have to do much more, but we have also learned a lot”.*

He would like to enhance the augmented reality experiences in the museum; however, he also sees some issues:

*“We plan to do much more in this direction. It's just always a question of financing. But let's say, if we had more possibilities – this is, of course, one of really great opportunities, also in combination with storytelling – we could revive many objects, and even more through augmented reality.*

*So as I said, we could have different levels of texts, we can say more, we could add a comparison of objects or photos that leads to animation, we can arouse emotions, we could for instance – if it is an exhibition about a specific period of time – play the music of that time in the background, and of course we could add different languages. So, augmented reality could be something very beautiful and probably in further development, it will even include three dimensional images.”*

- **“du bisch dra” – Engaging with potential visitors via social media**

Another project, which was launched by the Liechtenstein National Museum in 2013, was the ideas competition “du bisch dra” – “it's your turn”. Via Facebook, people were asked to submit their ideas on the Liechtenstein National Museum of the future. Figure shows the flyer that was used to announce the competition. In order to increase participation, prizes were awarded to the most creative and the most useful ideas. Further, users had the possibility to like other ideas. The ideas with the most likes were awarded weekly prizes.

The Facebook app “Brainstorm” from Napkin Labs was used to collect the ideas and to interact with the participants. The advantages of this app included its integration into Facebook, its design, its marketing possibilities as well as its monitoring and reporting possibilities.



Figure. Flyer for the idea competition “du bisch dra!”



Figure. Flyer for the idea competition “du bisch dra!”

Within one month, the competition reached 1800 views, 500 likes, and a total of 53 ideas were collected. Figure shows how the numbers of views, likes, and ideas developed over this one month.

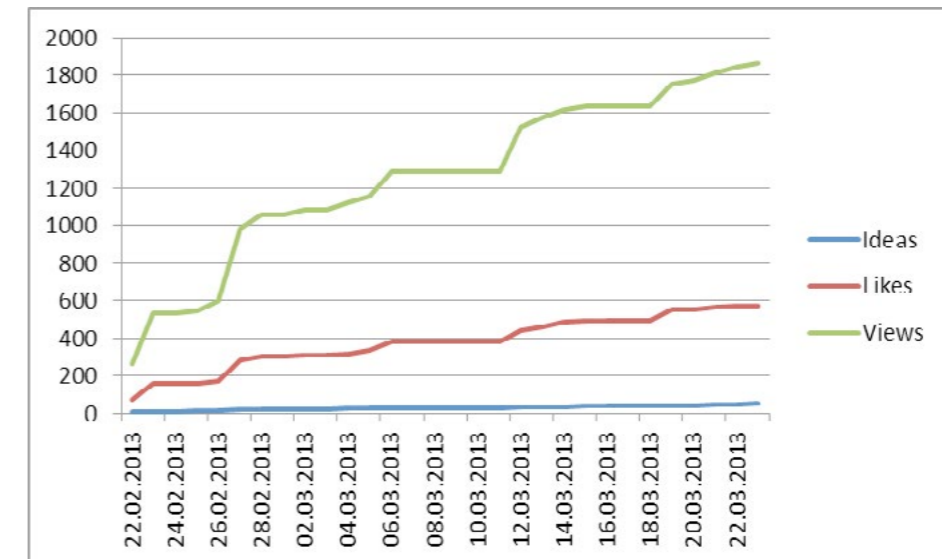


Figure. Cumulative numbers of views, likes, and ideas.

Apart from the potential of the collected ideas, the campaign also had a good marketing effect. As you can see in Figure, the number of likes of the museum's Facebook page increased significantly during the time of the idea competition.

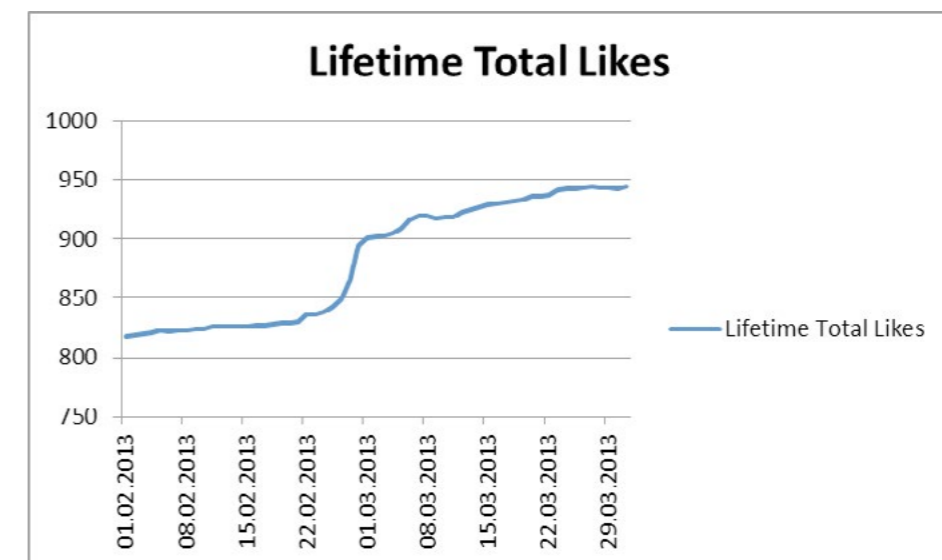


Figure. Effect of idea competition on likes of the museum's Facebook page





Figure. Prizes were awarded to the most creative and the most useful ideas.

Prof. Dr Vollkommer also sees many advantages of the project: *“It was just a great experience to see so many different people participating in this project. The idea was that everybody has had the opportunity to say how he imagines the national museum of the future. What kind of exhibitions and in which form the visitor would like to have them. And above all, it was very interesting to see that a real community was formed, which then entered into a dialogue for weeks. Every week the community awarded a prize to one project. This was already a very nice experience and interesting for us. The participants were not only from Liechtenstein, although the title was formulated in our dialect. It was great to see that there were also participants from a lot of other countries. So also this effect was very interesting. And then, of course, the different proposals. Some of them were utopian and therefore not practical, but still interesting as an idea. It was very interesting to see what spectra and what kinds of people were participating. Hence it was also a great project and we were more or less the first who did something like that in Europe. I could very well imagine this kind of project in many other museums as well. It helps very much to get in dialogue with people and learn from them.”*

However, besides his enthusiasm about the project, Prof. Dr Vollkommer also has to admit its limitations: *“We did not really implement anything, because just as I said the suggestions as a brainstorming were outstanding, but in detail they were not feasible. But still great.”*

- **Liechtenstein Moments – Creating digital contemporary witnesses**

Another project of the museum that uses the possibilities of social media was the project “Liechtenstein Moments”. Social media (Twitter, Instagram, Facebook) posts that were marked with hashtags related to Liechtenstein or the Liechtenstein National Museum, for instance #liechtenstein, #vaduz, #schaan, or #gafadura were collected and shown on screens in the museum. Prof. Dr Vollkommer explains the idea behind the project as follows: *“In fact, it was about asking the visitors to take pictures of their impressions and then let them show these impressions to us on a screen. And for us it was interesting for several reasons: What is interesting for the visitor in our museum? What kind of objects do they like most or what theme do they feel is exciting? What is worth reporting about our museum and about our country? And we have learned a lot of things because we have gave them the keywords: they had to enter either “Landesmuseum” or “Liechtenstein” and then we realized interesting things we hadn't thought about before, e.g. we did not know that other people would also post a lot of messages with the same keyword and therefore a lot of different photos and messages appeared on the screen.”*

Visitors to our museum also seemed to like the idea: *“Everyone who entered the museum got a slip of paper which stated that they can join us via Instagram or Twitter, and it was done again and again. On the one hand, there were those who consciously used it, and on the other, there were those who did it unconsciously because they also entered the keyword Landesmuseum or Liechtenstein through Instagram and then they were automatically included. Many visitors also thought it was a funny idea and participated. They liked to sit in our room where we had set up the screen.”*

The data was stored and used for further analysis. For instance, as Figure shows, a relationship was found between certain events (e.g. the annual national festival “Fürstenfest” on August 15th, or the start of the new semester at the national university at the beginning of September) and the amount of posts.

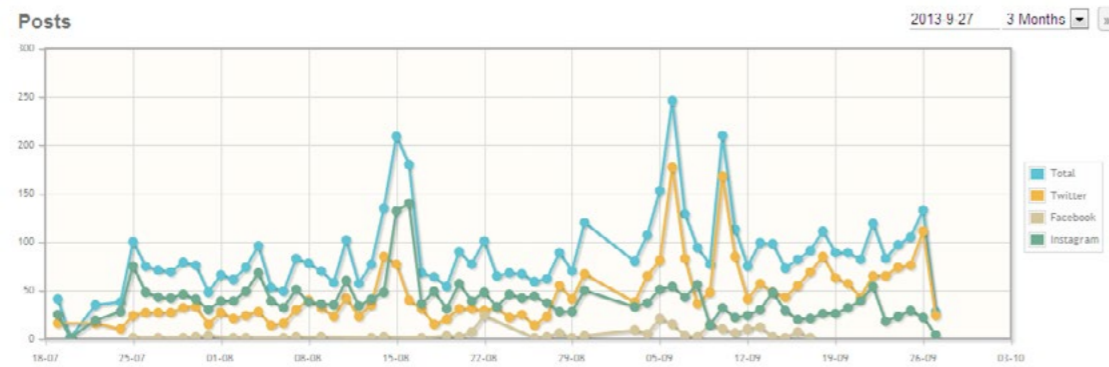


Figure. Daily posts

Prof. Dr Vollkommer reports on some other interesting findings: *“In different seasons there were different preferences. In the winter, there was more skiing, in the summer more football, beach volleyball. What was also interesting for us, and we had not known about it at all, was that there is a very well-known Manga figure in Japan, which is called Princess Liechtenstein. So we learned about her existence. Another very popular topic was food. There were many photos showing different dishes, which have just been eaten in Liechtenstein. And then, in the case of objects, it is also interesting to see which objects people were most interested in. There were also a lot of photos showing our nature. Many animals as well as certain plants were often shown.”* Now that the data has been stored, it might not only be used to show the current interests of the people, but the posts might one day serve as contemporary witnesses of our time.

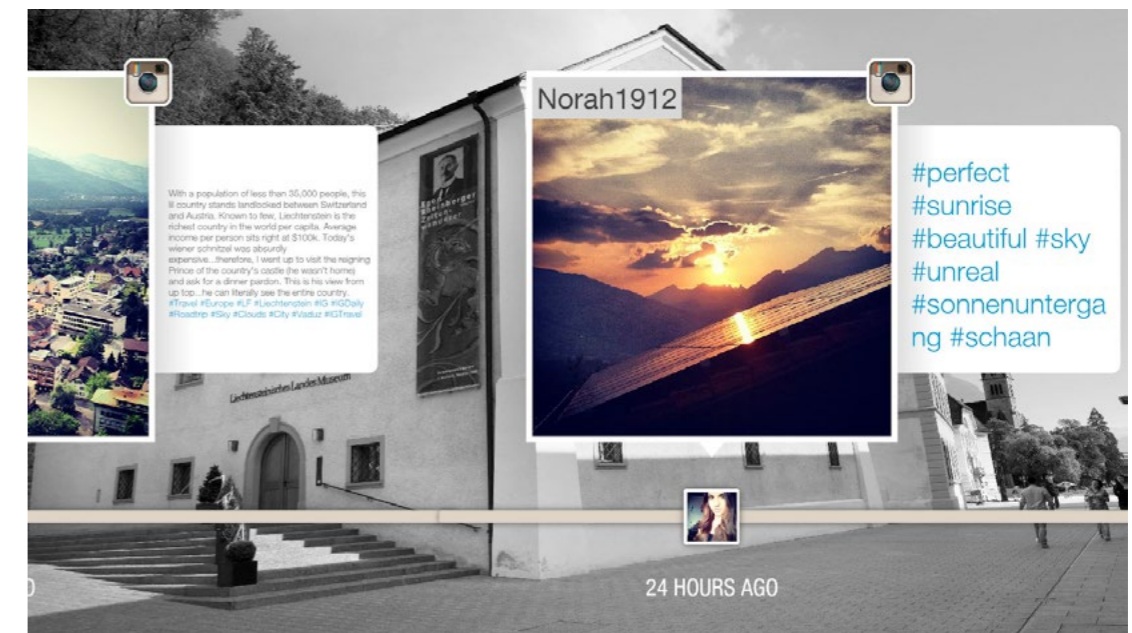


Figure. Examples of social media posts that were marked with hashtags related to Liechtenstein or the Liechtenstein National Museum were collected and shown on screens in the museum

## • Digital postcard – Switching from digital to print-out

Master's students at the University of Liechtenstein regularly engage with regional companies and organizations to collaboratively develop innovative solutions for real-life business and IT problems. Against this background, the Liechtenstein National Museum participated in a project seminar at the university. The students were asked to conduct a feasibility study and support the museum in developing a prototype of a terminal that could help to promote the museum and its exhibitions. In particular, the terminal was supposed to allow the museum's visitors to send e-cards or print postcards based on pictures they took during their visits. The students developed a mobile app prototype that provided a foundation for the project.

Prof. Dr Vollkommer was satisfied with the project results; still, it will take some time until the ideas are finally realized: *“The first test was successful. But the original idea was only theoretical and then it had to be implemented. The first difficulties arose: the implementation costs, even if it was a very cheap approach, it costs a few thousand francs: for the purchase of devices, installation, programming the application. Initially, we did not have money assigned for it. Luckily,*

*I found a sponsor who agreed to pay for it. It took a few months to find him. Now we could continue the project in the summer, early summer. Then the application had to be programmed, the devices had to be bought, and now we are ready to make the first attempts and hopefully next year it will work.”*

- **Digital exhibitions – bringing the exhibition to the visitor's home**

Digital exhibitions are one of the visions of the director of the Liechtenstein National Museum: *“I could imagine that we develop videos in Liechtenstein, which can then be sent to another museum, and vice versa, perhaps this museum sends a video to Liechtenstein about an exhibition they are preparing. It is then shown on flat screens in both museums and thus we have an exchange. And of course, it could be published online.”* However, creating and sharing videos about exhibitions is only the first step of digitalizing exhibitions. Prof. Dr Vollkommer can also imagine organizing joint exhibitions, where parts of the artefacts are shown as originals and others are only shown digitally as the originals are exhibited in a partner museum. In his opinion, one big advantage of such joint or complementary exhibitions would be the lower cost for transporting artefacts which is always a big issue for museums. However, transportation of original artefacts *“will certainly remain necessary, because the feeling of the original is important. Still, this might be a potential solution for supplementing artefacts that simply cannot be shown as originals at a given point of time or that are not transportable for restoration reasons”*. Furthermore, one could *“bring in objects that are perhaps not even moveable, such as architecture, which can then be integrated. But it can also be reconstructions or compositions.”*

One might worry that digital exhibitions will result in a situation when visitors will not come to the museum anymore but consume the exhibitions online from their homes. However, Prof. Dr Vollkommer also sees some possibilities here – for him, digital exhibitions might be an incentive to visit the museum to see the original, and thus, digital exhibitions might also be serving as a marketing tool. And even if this does not work, the Liechtenstein National Museum has an educational mission. So even a person who is only visiting the exhibition digitally can be seen as a small achievement. So, for Prof. Dr Vollkommer it is better if people *“sit on a sofa and find information about the museum on the sofa than if they do not come*

*to the museum at all and do nothing. It is also a form of added value, at least for the value we want to create.”* He also thinks that it will happen even more frequently, so in the future, there will be real visitors as well as digital visitors.

- **Why museums are not yet digitalized – the hurdles of digitalization**

Besides having several ideas on how to implement digitalization in the museum and being convinced by the necessity of digitalization, Prof. Dr Vollkommer also sees three disadvantages or barriers to digitalization: *“The first disadvantage is the availability of technical devices, since you must have some equipment. Then the next barrier is the know-how one must have. As discussed previously, it is often very difficult, particularly in museums, since people working there are often already older and thus do not have the required technical knowledge. [...] And conversely, you cannot expect a technician who has the required technical knowledge to know the data of the objects. So there must be a strong dialogue until we come to the generation which can do both. That is why it will always be easier in the future.”* In addition to these barriers, the development costs must also be particularly considered because it is difficult to find sponsors for digitalization projects. As Prof. Dr Vollkommer admits: *“In general, yes, because again, sponsors are generally older. And they do not understand digitalization. But it is also possible to find a sponsor who at first admits that he cannot understand it and requires more convincing. Another problem might be: the sponsor wants to have a counter value and asks himself if it will pay off for him to invest money in it? What is the added value for him? Well, they can say that they have done something with us.”*

Further, the digitalization of objects is a longer process that might never be finished due to a high number of objects: *“All the museums have huge archives and depots. The problem is that every object has to be precisely and scientifically classified with good quality photos. And we ourselves do not know how many objects we have. So we can only guess.”* Moreover, digitalization of an object takes time. As Prof. Dr Vollkommer demonstrates: *“For the digitizing itself, first the object must be brought into the photo space, then properly placed, photographed and, depending on its packaging, it first needs to be unpacked, and then adjusted. Then maybe a brief description has to be added, so you have to give it a number so that you find it, and give some headlines, otherwise it makes no sense. So we*

have calculated that for each object you probably need at least two hours. And now you can calculate these two hours when it comes to hundreds of thousands of objects.”

- **Digital Museum Innovation Summit – Sharing experience on the museum of the future**

Apart from engaging in several projects on museum digitalization, the Liechtenstein National Museum is actively searching for exchange of experiences with other museums. Therefore, together with the Institute of Information Systems of the University of Liechtenstein, the museum organized the Digital Museum Innovation Summit where questions like “What does the museum of the future look like?” and “Which new technologies and concepts will enter museums in the next years?” were discussed. Representatives from several European museums participated in the summit, and made it a full success. In the future, exchange between the museums will also be a key factor for the success of digitalization in these institutions.

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Azuma, R. T. (1997). A survey of augmented reality. *Presence: Teleoperators and virtual environments*, 6(4), 355–385.

Sommerauer, P., & Müller, O. (2014). Augmented reality in informal learning environments: A field experiment in a mathematics exhibition. *Computers & Education*, 79, 59–68.



Figure. Representatives from several European museums took part in the Digital Museum Innovation Summit at the University of Liechtenstein.



Per Øyvind Riise

# Digitisation of Norwegian cultural heritage

01	OLESTAND	Førvevoks (flere i eske)	IN	ÅR	1990	IN	NUM	VF 7770
02	SPESIFIKASJON		IN	KAT	1990.08 BEJ	IN	PLASS	001 - 29a
03	INNEHOLD	Vokning av trær, skomakeri	IN	FOOT		IN		Figur 2580 Neg.: 5
04	DATERING	Ca. 1960 - 1966						
05	OPPRISNING	Henrik Mergelandsgt. 45, Kristiansand						
06	PROVINS	Tyskland						
07	NAVN	(41) Solås, Karl, f. mai 1899, d. februar 1990. Ringlebekk, 23, Sedal, Skomaker. (21) Ivedt, Grethe, Byensv. 41 C, Ivelt. Kariapåkåre, Kogge, Vossbyen Haynes, Signe, Bydalsøyen 4 og Olson, Alfhild, Land - alle Kristiansand.						Skomakermester Karl Solås gikk i lære hos skomaker Håstel, som drev stort skomakerverksted i Kirkegl., på hjørnet av Dronningegate. Håstel både sydde og reparerte sko, sydde hanske, bl.a. sydde han for politiet i mange år. Da Håstel sluttet ca. midten av 1950-årene, overtok Solås en forretning i H.N. gt. 45. Solås drev denne skomakerforretningen frem til ca. 1966. Solås fikk 1. pris som skomaker på en håndverksmesse i slutten av 1960-årene. Noe av utstyret som Solås brukte, kan være kjøpt/overført fra Håstel. Skomakerverkstedet var en enmannsbedrift. Kona stod i butikken. Grethe Ivedt (en av givene) stod også noe i butikken. Litt.: Bae, Liv Hilde og Ingrid Lowzew: Det gamle skomakeri. Oslo 1989.
08	MATERIAL	Voks, papirromlag						
09	TEKNIK	Fabrikk						
10	FORMÅL	Trekantede						
11	FARGE	Hvite, grå, brune, sorte, rosa, rød, kamel.						
12	TEKST	Trykt tekst på papirromlag.						
13	ANDRE	Morello farbsaechte, zum anputz ohne kaltpoliertinte, også trykt bruksanvisning.						
14	STREKSEL	Morello						
15	MALE	Ulike størrelser. Størster L: 17,5, B: 3,7 cm.						
16	MØN	Mindre: L: 10,0, B: 2,5 cm.						
17	UTSAND	De fleste vokstykke er brukt i skoproduksjonen. Ved brukte.						



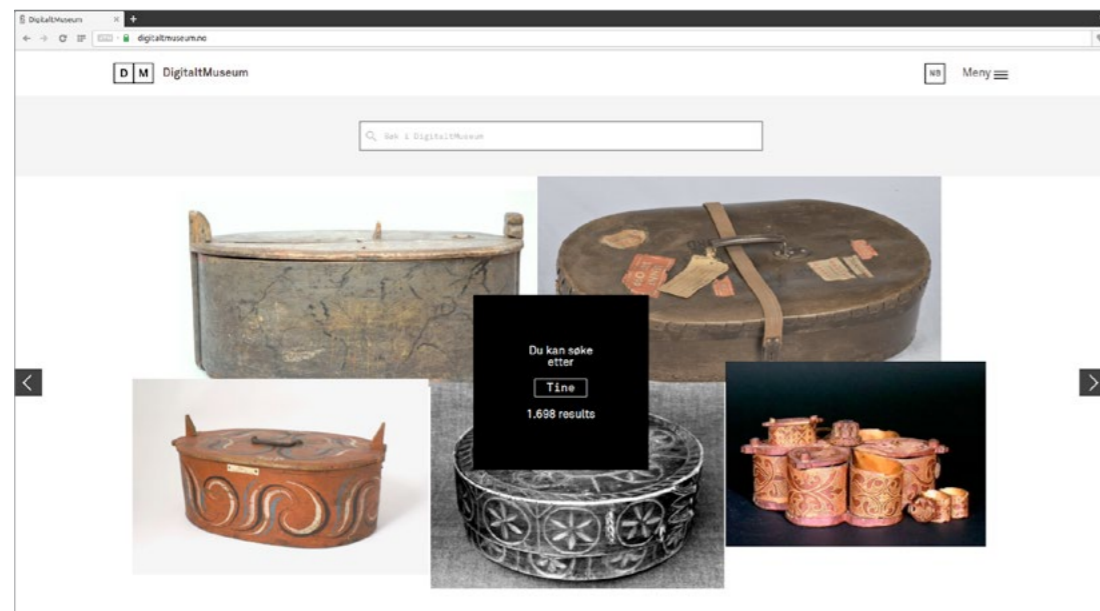
- **A brief history of collections online**

The history of digitisation of Norwegian museum collections can be traced back to the first attempt to use computers in the management of collections. In 1979, the Norwegian museum association launched a common standard for registration that aimed to be of use also for the future catalogue software.

Five years later, in 1984, a research project was initiated by the University of Bergen to create a program for personal computers that could be used for registration of museum collections in Norway. This software was launched in 1991 as «REGIMUS», together with the common specification for registration.

In the emerging world wide web in the nineties, a few Norwegian museums made their presence on the web with short presentations of the museums. The Norwegian Museum Authority saw the potential in the use of the Internet both to communicate the information about our museums, as well as sharing the collections online. As part of this strategy, Museumnet Norway was launched in 1998, and selected museums were given funding to advance the use of online access to the museums' collections.

At the same time, four Norwegian museums received funding to create the next generation of collection management software (CMS), PRIMUS. The first version of PRIMUS was launched in 1998, and is still today the predominant CMS in use in Norway. PRIMUS was not initially designed to give the public access to the database through online searches, however the need for such access soon became a highly prioritized project.



After several years of development, the DigitalMuseum [[www.digitalmuseum.no](http://www.digitalmuseum.no)] was launched in 2009. This portal gave access to a common database with combined registration data from several museums using PRIMUS, and quickly most museums using PRIMUS chose to publish parts or the whole of their collections on DigitalMuseum. Today, the DigitalMuseum gives access to 184 different collections, comprising more than a million photos and close to 600,000 objects.

To facilitate the use of open data from Norwegian cultural heritage institutions in general, Norvegiana was created in 2012. This is a common search interface both for the data from the DigitalMuseum and numerous other data providers such as the National archives, the Norwegian Mapping Authorities, and the Directorate for Cultural Heritage. Norvegiana additionally provides the Norwegian data to Europeana.

- **Objectives of digitisation**

There will of course always be a variety of objectives for digitisation, but there have been a few persistent ones dating back to the very beginning of the process. These have been partly internal objectives, and partly external. The conservators in the museums have often focused on professional needs in terms of collection management and development, whereas communicators, authorities and politicians have stressed the need of giving the public access to the troves of the museums.

Among the museums there has been a strong drive for the development of common solutions, in order to facilitate the coordination of collection management through common standards, common software and common training. This way, museums have aimed to be able to see the collecting and preservation of Norwegian cultural heritage as a whole; in order to minimize parallel collecting practices between museums in the same region or field. To achieve this, there has been a continuous search for tools that help museums coordinate their practices. Digitisation has also been seen as a way of preserving the objects – once the object is digitised, the need for handling the objects is reduced.

The most important drive for digitisation, however, has been the objective of giving the public access to museum collections – repeated in several parliamentary white papers and numerous speeches given by museum directors over the last decades. Only about 10 % of museum objects are on display in the museums, and digitisation of collections has been promoted as a democratisation of museum practices in Norway.

- **The first toolbox**

With the objectives of increased cooperation between museums in their work with collections, the strategy for creating a unified online interface for all the collections of the Norwegian museums was from the very beginning built on three elements: a common nomenclature, a common classification and a common database structure.

The work on establishing common nomenclature and classifications systems dates back to the period before the digitisation process. The idea was – and still is – to use terms consistently within the Norwegian museums; to literally call a spade a spade every time, everywhere. When applied to digitised collections, the need of a common nomenclature stems from search habits. If too many similar and overlapping – though different – terms are registered in the database, it becomes difficult to find the actual object you are looking for.

In much the same way, the need for a common classification system used by all museums should make it possible to retrieve information about all kind of different objects relating to a specific notion, use or other aspect of human activities. The libraries in Norway have been using the Dewey classification system since the turn of the last century, but it was considered to be too science-specific

and library-centric to meet the need of museums. Instead, the classification system *Outline of cultural materials*, created by American ethnologists, was introduced in Scandinavian museums in the seventies. This system was first used to organise the manual card-based registration systems, and was later incorporated in the museums collections management systems Regimus and Primus.

Now, to combine all the data from the different museums, it should be simple to just import data from all the different museums into a common database, given the use of a common software, use of common nomenclature, and use of common classification system. The work started out around the turn of the millennium. However, this turned out to be a difficult task, spanning over several years, to make a sensible common interface for the combined data from the different Norwegian museums. The biggest obstacle was that – in spite of the use of common standards – the actual registration work had not been done in a consistent way across the museums. Software developers had been very generous in adapting and tweaking the software to accommodate many specialised needs of different museums, and the specialised use of these different kinds of data fields made similar data appear in different places. There were also huge variations in place names which had been registered, in the way dates were recorded – not to mention the problems arising from trying to combine information about a specific person relating to the objects without any unique identifier in the different databases.

Some of these problems arose from the way the work on digitization was organised in the nineties. Museums were struggling with huge backlogs, and even though they started registering new objects digitally in the nineties, there were little or no resources to start converting the paper-based registrations. To amend this, several digitisation projects were established, involving the use of unemployed and untrained workers in workshops where the digitisation of the manual registrations was done along with scanning of existing photos. The upside was an efficient and cheap work process, the downside was using non-professionals in the registrations work – merely replicating errors in the original registrations, and often adding new ones.

Finally, in 2009, the DigitalMuseum was launched, built upon a common database with data from Norwegian museums. The solution was to create filters when importing the different CMS databases, and to combine different ways of registering data on scheduled imports. The data structure in the unified database is much simpler, which helps to increase the relevance of the – often sparse – information that is registered by the museum for a specific object.

- **New tools emerging**

During the last decade, new ways of combining data have emerged also in Norway. Instead of merging different datasets from cultural heritage institutions, the idea is to provide data in ways that make it possible for others to make use of your data and combine it with their own, or let others aggregate data from a lot of different sources.

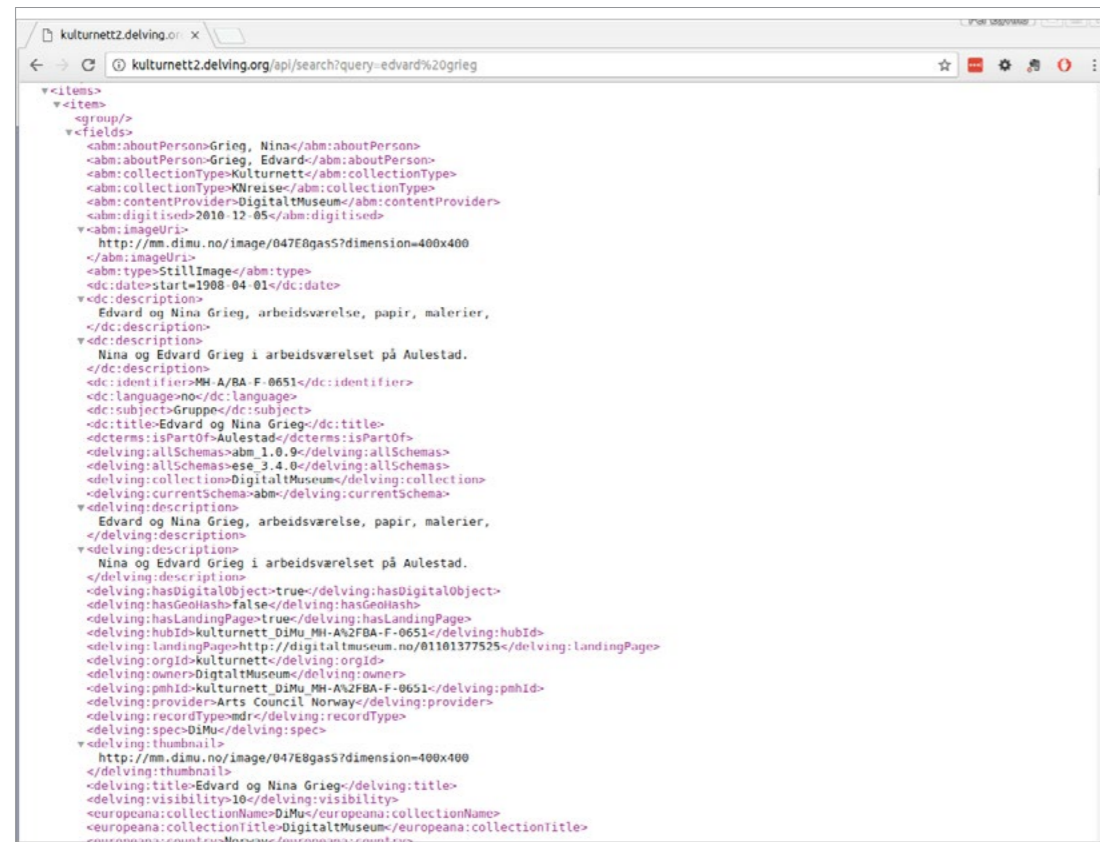
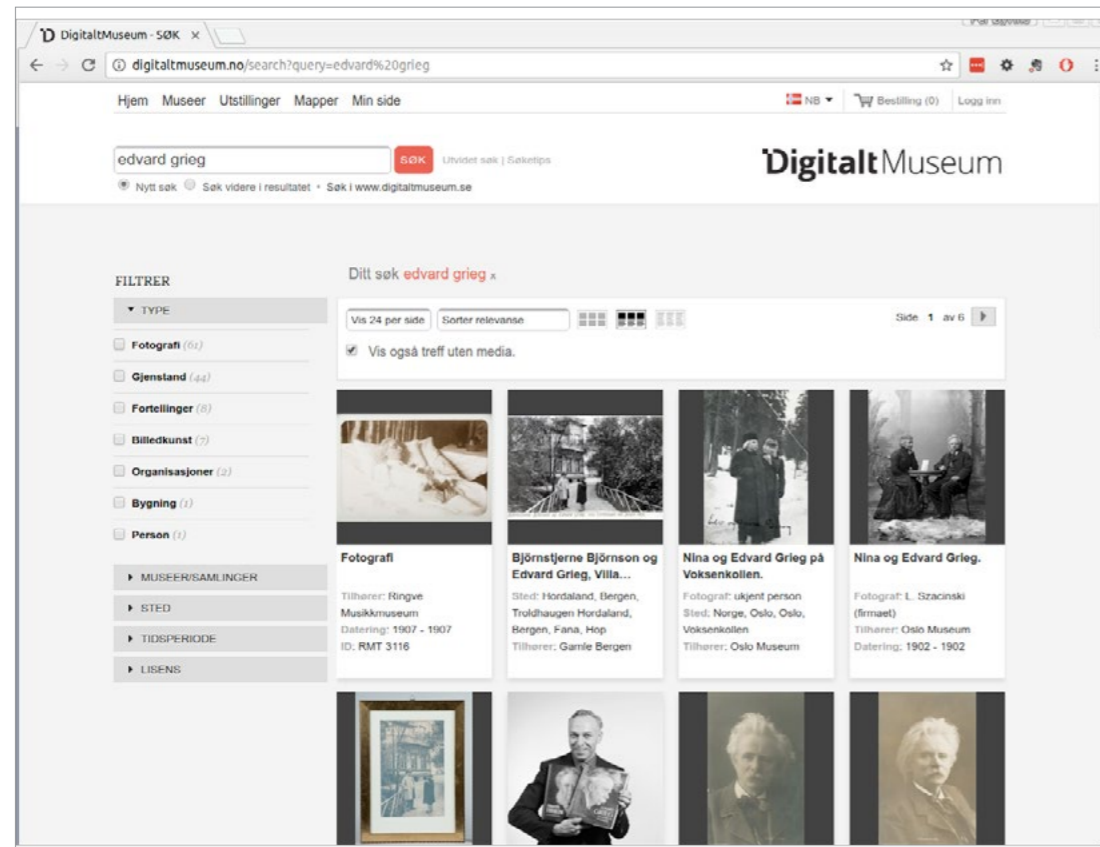
The cornerstone of this approach, is the concept of *open data*. Open data in the broad sense is the belief that data provided by public funding should be freely available. Typical sources for open data are governments, research institutions and cultural heritage institutions. The data should be provided as CC-licensed data, meaning it should be possible for others to reuse the data without breaching the owners IP rights.

On another level, this data is provided as *linked open data*. Linking the data to unique lists of identifiers (*authorities*) makes it possible to connect one source of open data to another. In a museum context, such lists may be term lists provided by a museum specialising in a specific field, national lists of artists, international lists of place names and so on.

To make this useful, the owner of a dataset of relevance to others must provide this data in such a way that computers may interpret them in order to reuse the data in other contexts. This is done by providing the data through *APIs*, in simple terms web addresses that return data not as ordinary web pages but in a syntax that a computer can process in a meaningful way.

This way of sharing data makes it possible to aggregate data from different sources, without the need to fit everything into the same database. If a museum publishes its data this way, it gives other parties the possibility to enrich their applications or services with data from the museum; thereby adding value to the museum's digitisation efforts.

The old approach – combining everything in a single database – can also be useful in this context. DigitalMuseum in Norway now provides an API to the combined database, and thereby makes it possible for developers to include data from Norwegian museums in other applications.



## • The need for linking data

The need for combining data becomes obvious when more and more sources become available through the digitization processes in different cultural heritage institutions. For someone with an interest in the composer Edvard Grieg and a wish to create an app or a web service dedicated to Grieg, there are multiple relevant sources of information:

- Biographical information from Wikipedia and Norwegian online encyclopedias
- General information from Edvard Grieg Museum Troldhaugen
- Sheet music from the Bergen public library and the University library
- Statistical and genealogical information from the National archives
- Archival information from several European sources

While all of these institutions provide their information about Edvard Grieg free of charge – generally without copyright restrictions, and normally even without ad-revenues dependent on use, you still have to visit most of these pages as a human, and copy the relevant information to be able to use the information provided. If new data is published, or old data amended, the whole process has to be repeated.

This approach of course makes sense if the priority of the institutions is to attract as many users as possible to their own web pages. There are also legitimate concerns about losing control over the context within which the information is provided; although you cannot stop users from manually copying and reusing copyright-free content, you can make it harder by not offering easy ways of integrating your content in other contexts.

However, the most probable reason why these institutions do not offer their data as open data with an API for developers, is lack of resources and lack of knowledge. The museum webpage will often be developed by people who are more concerned (and capable) in PR-work than API-protocols. The sheer satisfaction of getting the data online in the first place stalls further development, and the question of making an API may very well never have been asked.



## • The food-chain of digitised cultural heritage

The combination of the widespread use of one single collection management software and the drive towards sharing data, has created a pyramid for the assembly and distribution of digitised cultural heritage from Norwegian museums.

Common search in enriched data from European cultural heritage	<b>Europeana</b>	Public access, API-provider
Provide access for 3rd party users and apps to Norwegian cultural heritage data	<b>Norvegiana</b>	API-provider, harvest data from archives, museums and other public data sources
Common search in museum collections managed in PRIMUS	<b>DigitalMuseum</b>	Public access, API-provider, data from the different PRIMUS databases
Collection management, including documentation, inventory, logistics, etc.	<b>PRIMUS</b>	Internal needs (CMS), no public access, individual databases

The collection management software PRIMUS is a daily tool for museum workers across Norway, and through the common database DigitalMuseum and the aggregator Norvegiana, the result of the collection care worker's efforts ends up in Europeana's vast collections.

There are several drawbacks to this model. The DigitalMuseum does not include digitised data from CMSs other than PRIMUS, and according to the company that developed both services, there are no plans for changing this. Presently about 70 % of all Norwegian museum use PRIMUS, or a higher share if the university museums and private art museums are excluded. This may partially be amended by Norvegiana's possibilities of harvesting data also from CMSs other than PRIMUS.

Another concern – which is becoming increasingly apparent – is that the digitisation is still very often done for the purpose of internal needs. A low-resolution photo taken in a hurry may suffice for the need of the museum's catalogue, identifying the object and its condition, but may not be very usable in other contexts. The photos have often been deliberately published in low-resolution, with added watermarks and so forth, to avoid unauthorized use of the image. Instead, if the digitisation were done explicitly with reuse in mind (e.g. by adding metadata such as GPS coordinates in the image file), the result would be more versatile.

However, the greatest obstacle to digitisation of cultural heritage is not related to technology or lack of perspective – the most common reason for not digitising collections is resources. There has been a great backlog both in registration and general collection management, and the priority of many museums has been to safeguard the collections on the basic level, and get an overview as efficiently as possible, while digitisation requires more than many museums have been able to allocate to the process. In 2014, museums reported that only 9 % of their collections were digitised, and only 4 % were published online.

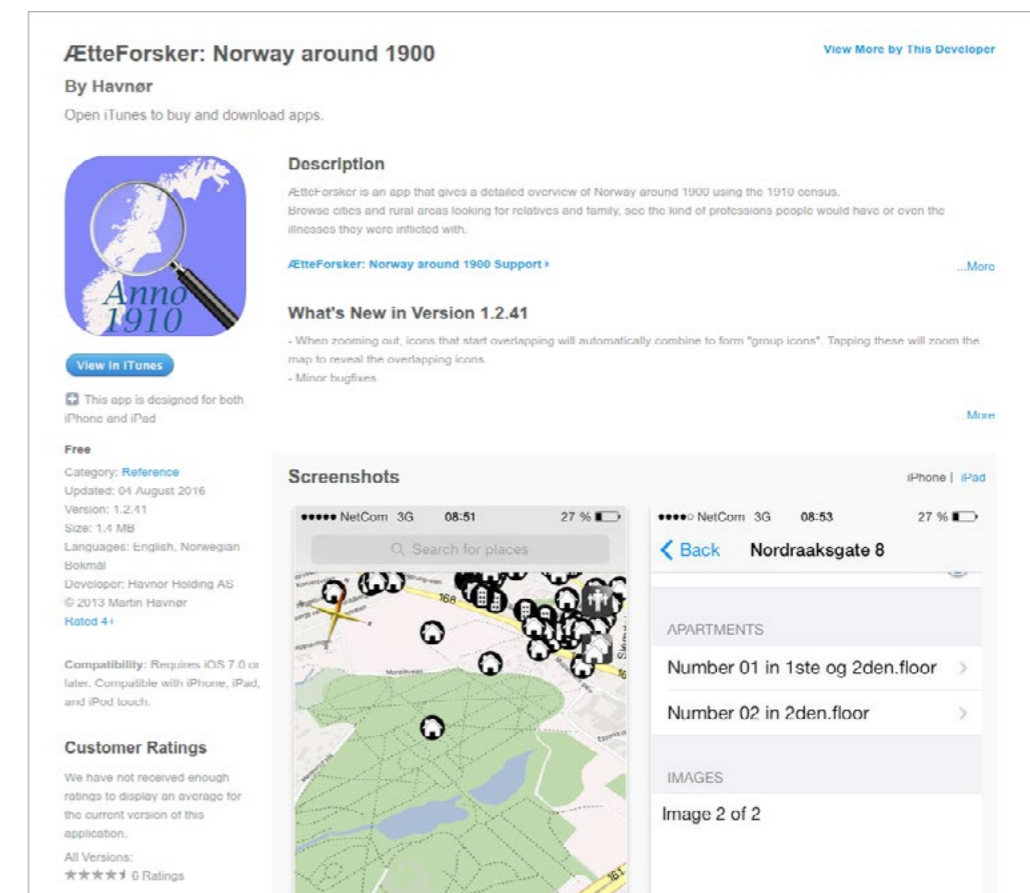
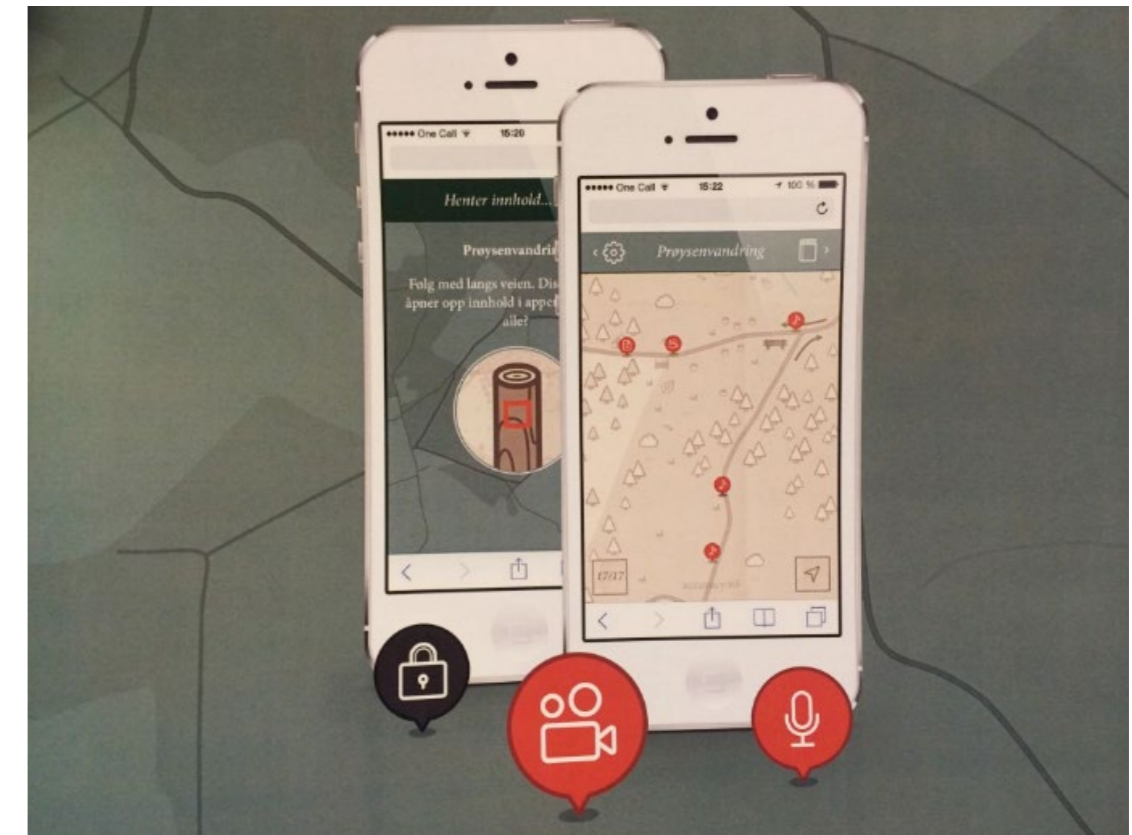
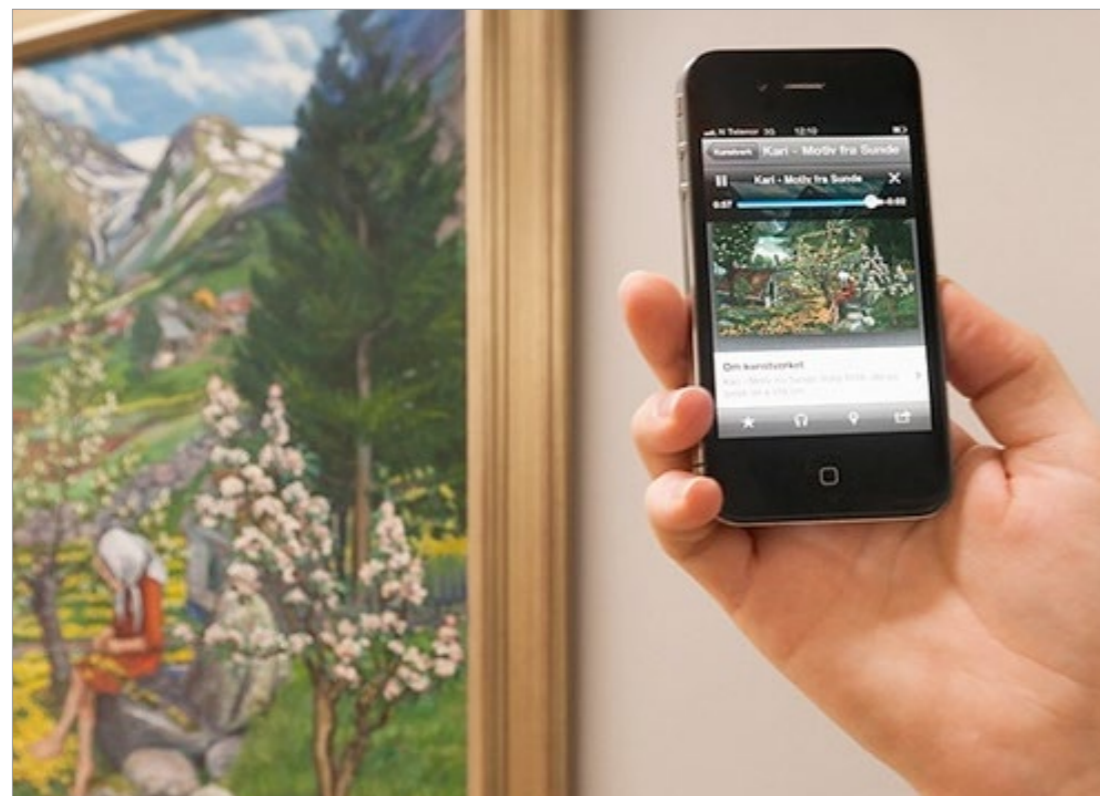
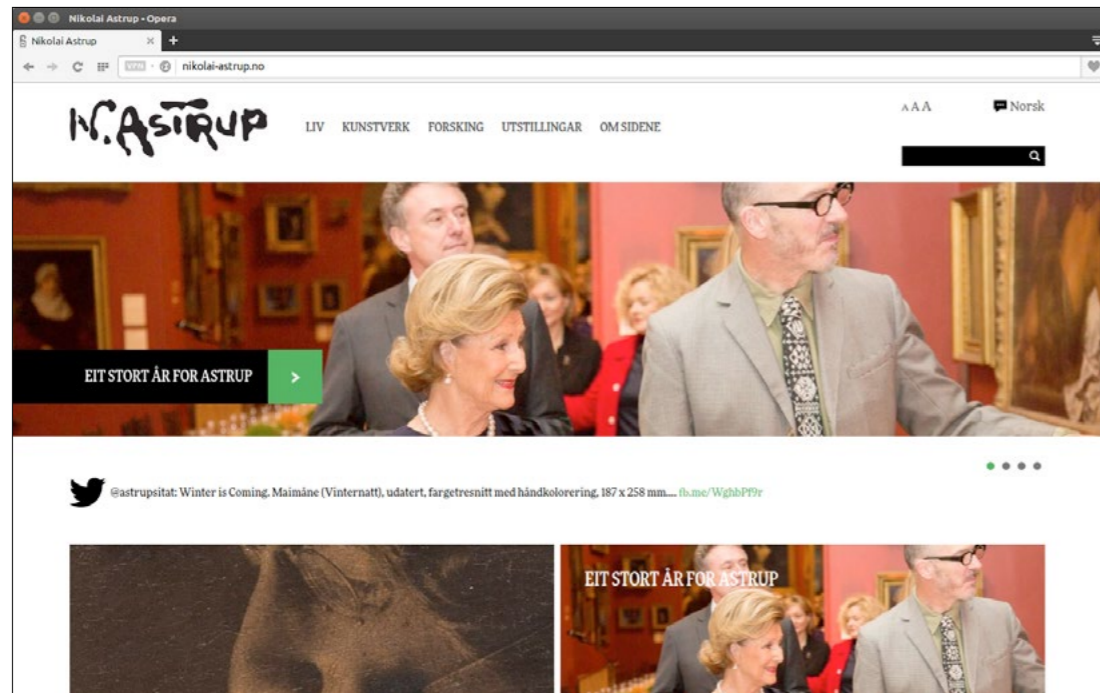
## • Digitised cultural heritage reused

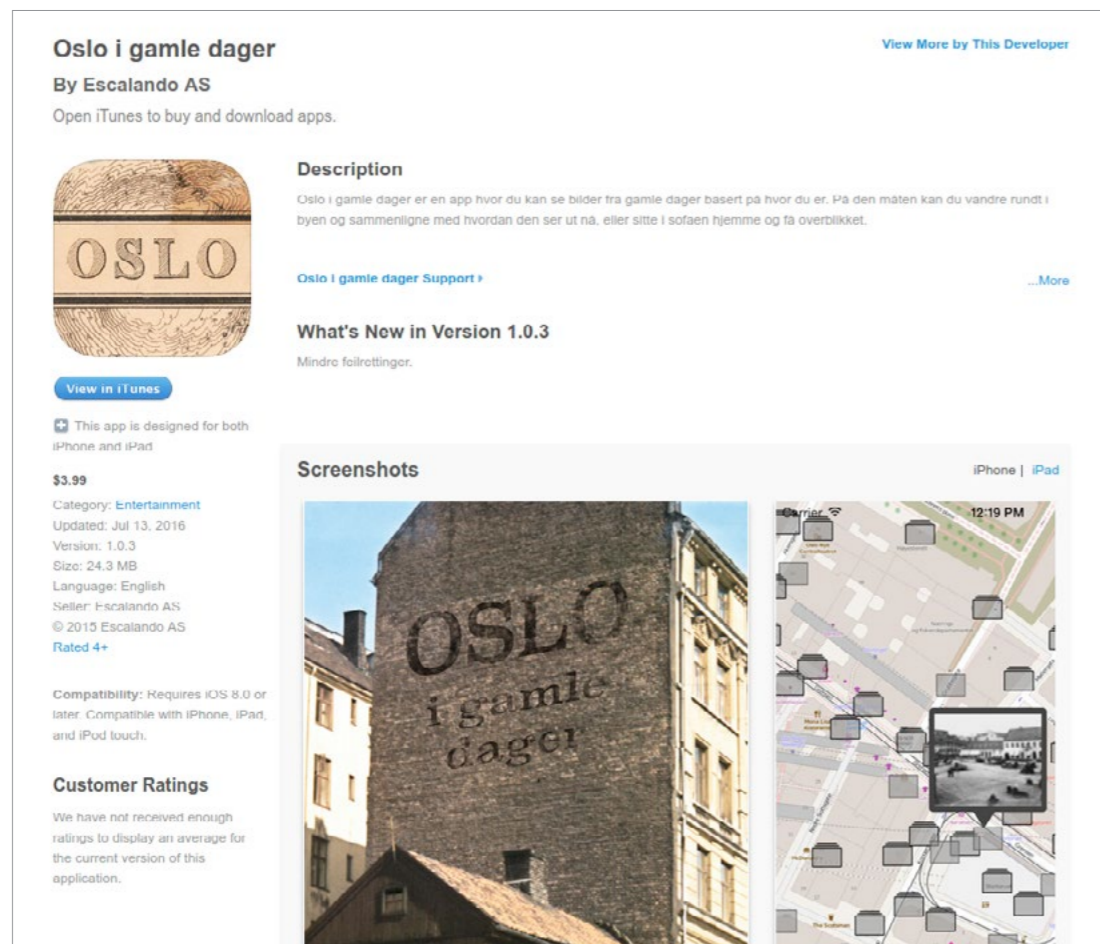
With the advent of smartphones, the trend of creating dedicated applications for every need has also reached the cultural heritage sector. We have also seen more and more websites using data from cultural heritage institutions, often through the Norvegiana portal.

Early examples of such mobile apps were digital museum guides, especially for buildings and environments not suited for posters or fixed screens – such as the Nidaros Cathedral or open-air museums. In the past few years, we have seen more innovative interactions between mobile apps and exhibitions. In 2011, the KODE art museum in Bergen launched an exhibition on the works of the artist Nikolai Astrup. The innovative part was that the exhibition was combined with a dedicated website presenting the digitised and annotated drafts and notes from the artist's sketches, notebooks and letters from the National Library. This material was also part of a mobile app for the exhibition using QR-codes to give the audience additional information, and also an app presenting the geographical area where the artist lived and found his motifs. This way, the digitised material was the foundation of a cooperation between the library, the museum and municipalities, giving added value to each other's data.

However, none of these apps have taken advantage of the possibilities to use the already available digital content through the services of DigitalMuseum and Norvegiana. The rise of these kinds of apps came with the project *Heritage Here* operated by the Norwegian Arts Council in 2012. The aim of this project was to promote the use of open data from institutions managing cultural and natural heritage like museums, geographical institutes, national parks etc. This was done both through apps initiated by *Heritage Here* and by organising a “hacking

workshop” for coders to create apps using open data from Norvegiana. Several apps have emerged through this strategy, spanning from guides to industrial heritage sites in Oslo and from travel apps covering the whole of Norway to genealogy apps based on digitised parish registers and censuses.



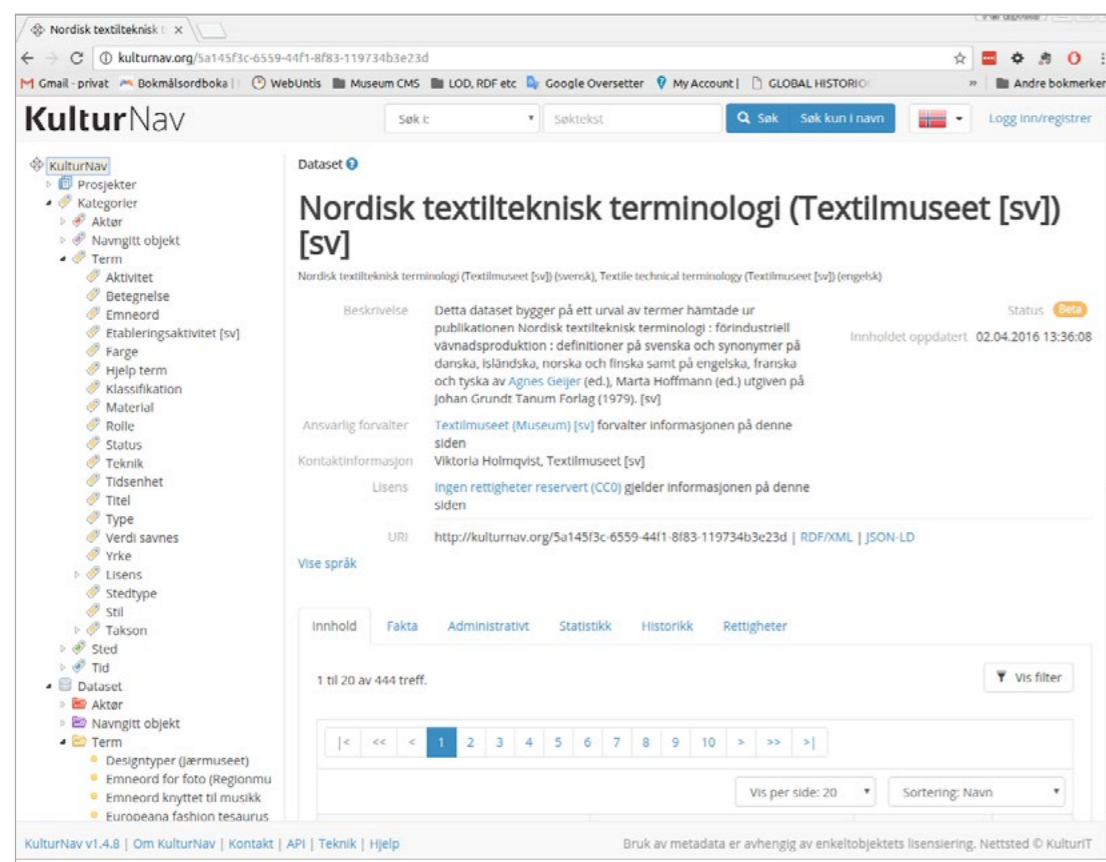


• **Reusing metadata – KulturNAV**

For anyone trying to combine data from different sources, two major problems typically arise: different datasets refer to the same concept but with different names, and different datasets refer to different concepts while using the same name. Place names change over time, and different names may be registered referring to the same place, depending on the database in question. When referring to persons, different museums have used different registers of person names, with no common identifier to know whether Ole Olsen is the same as another Ole Olsen – and there are thousands of Ole Olsens...

As previously described, the initial way of dealing with these problems was to define common nomenclature and classification systems. In reality, they were not the key to avoid these problems. The classification systems work as such, but neither references to person, time nor place are covered by the classification. With the digital use of databases, the way we search for and retrieve information has changed from the structured ways of old index-card systems to today's googling search methods, thereby reducing the value of classification. Additionally, the common classification system is too broad to be useful when dealing with specialised areas where classification still is useful. Regarding nomenclature, only a few groups of objects were covered in the 1980s when this work was carried out.

The recent approach to dealing with these issues is not to try to define national common term lists, person registers, and other authoritative lists, but instead to provide a framework for reuse of other museums' lists. This is called *KulturNAV* – Culture Hub. This is a website with term lists, person lists, and other terminology relating to cultural heritage. These lists are published as open data, free of royalties, and in standardised formats ready to be used by different collection management systems. When publishing a list on *KulturNAV*, the institution that publishes the list becomes responsible for its accuracy and future maintenance, and the system makes sure the list is uniquely identified and, if possible, interlinked with other lists. *KulturNAV* combines Norwegian and Swedish lists and authorities, and is provided by the Norwegian CMS producer KulturIT.



## • What does the future hold?

The attitudes towards the digitisation of cultural heritage have changed enormously in the last decades. In the 1990s, there was common scepticism towards presenting anything from the collections online out of fear of losing visitors – that the website would replace the museum exhibitions. With the advent of the more interactive and user-oriented web in the first decade of the 21<sup>st</sup> century, with social media like Facebook and community knowledge like Wikipedia, many museums feared that their role as the authority of knowledge was threatened, and hesitated to engage in open knowledge production, trying to keep their photos from ending up on Wikimedia, and hesitating to let people comment or add information to their own material.

Today, you will have to look long and hard to find any museum not wanting to publish its material online or not wanting the public to engage with its digitised collections. Today the obstacles are mostly the lack of funding for this work (or missing prioritization), or the lack of knowhow on how to proceed. Still, a huge

effort has been made in the recent years; in 2010, only 36 % of the objects in cultural history museums were registered in a satisfactory way, only 16 % were represented by digitised photos, and only 6 % were published on the web. In 2014, this was significantly better: half of the objects were satisfactorily registered, 30 % were digitised, and 16 % were also accessible online.

Following the change from digitising for internal documentation needs to digitising for reuse and high quality imagery, a new project has emerged. In cooperation with the National Library in Norway, the whole collection of the National Museum of Art will be digitised in high resolution in the process of moving to a new building. In addition, 360 degrees digital representations of the old museum building and its exhibition halls are being made to enable a digital recreation of the exhibitions in the old buildings. The main goal of this project is long-term preservation of the material, and more museums will follow in the coming years. It also makes it possible to create strategies like the ideas of Rijkmuseum in Amsterdam which more than any other museum has shown the way into new ways of digital reuse, wanting the public to engage directly with the high-resolution images made available without copyright restrictions.

The digital forms of communication are rapidly changing, today's cutting edge apps may soon be relics of the past. However, if the museums pursue the strategies of providing their digital resources not as the end point, but as a starting point for new digital ways of communicating the past, the objects may be given not only a second life, but perhaps indefinitely new lives.

Per Øyvind Riise

# Primus and Digital Museum

Although there are several Collection Management Systems (CMS) in use in Norway, there is one system with a predominant position, especially among cultural history museums. This software, *Primus*, was developed in its first version by two Norwegian museums, and since its introduction in 1997 has been adopted by a vast majority of cultural history museums, and a few art museums as well. In this article we will look into how this CMS came to life and its present status, seen both from a technical and user-oriented point of view. Furthermore, we will present the public portal for the data managed by the different users of *Primus* – Digital Museum.

## • KulturIT

The company in charge of the development and support of Primus and Digital Museum is KulturIT ANS. The company was originally established in 2007 as a general partnership between two of the largest cultural history museums in Norway – Norsk Folkemuseum (Norwegian Museum of Cultural History) in Oslo and Maihaugen (an open air museum in Lillehammer). In 2015, the company transformed into a limited company, with seven different museums in Norway as shareholders.

However, the history of KulturIT can be traced back further, as it was the direct succession of previous cooperation between the two initial owners. The idea was to establish the necessary know-how and development resources within the museum sector through developing a Norwegian CMS based on the previous work on standardisation and the first Norwegian CMS software Regimus. This was made possible through substantial financial backing from the Norwegian state, and a large customer group of museums using Regimus, which was discontinued in the nineties.

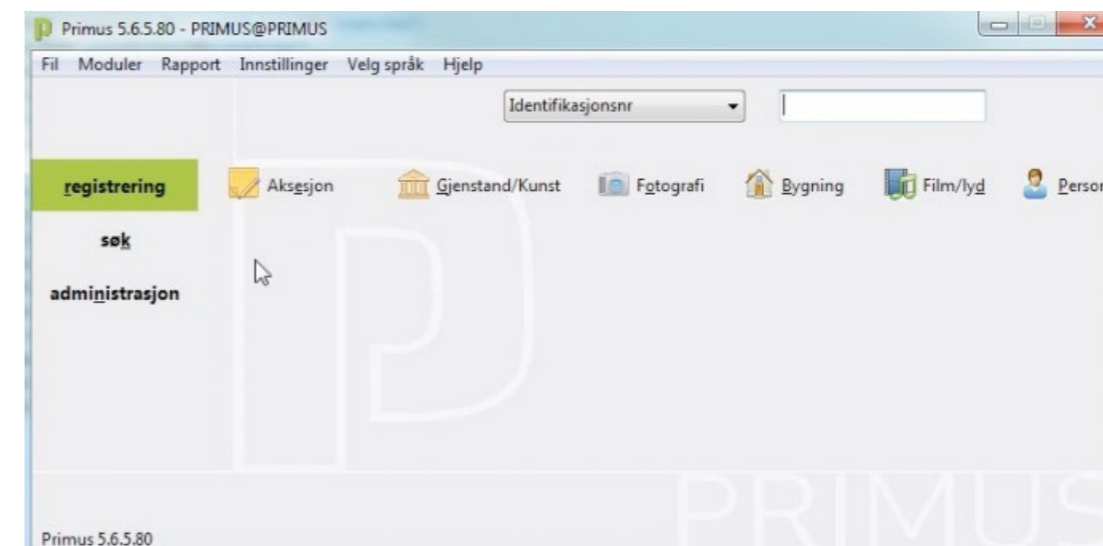
Today, the support for the software and maintenance of the different modules is financed by the museums who licence Primus. The licence model is based on the number of users, and can vary significantly between museums, typically in the range of 6–10,000 euros annually for a museum with 5–10 users. This includes the cost of licensing the underlying database *Oracle*. Altogether, KulturIT had a turnover of about 2.4 million euros in 2015.

The Norwegian government still support the work of KulturIT with grants directed towards new modules in software and special projects. About 25% of the company's revenues are grants from the government in different forms.

The company has also expanded to Sweden, where around 30 museums use the CMS Primus. KulturIT has its main office in Lillehammer, with branches in Oslo and Stockholm, Sweden.

Besides its main products, *Primus* and *Digital Museum*, the company also offers software for geo-localised information (*KulturPunkt*) and for management of authorities (*KulturNAV*).

## • Primus



Primus offers modules that cover most needs for collection management. For registration, there are different schemas to register artifacts, artworks, photos, buildings, architecture and design. Additionally, there are administrative modules for tasks such as acquisitions, loans, exhibitions and location of objects. The latest modules, built as web applications, are aimed at documentation of conservation and management, operation and maintenance of buildings, as well as a new module for archaeological materials.

What Primus still lacks is a robust digital asset management system, and compatibility with SPECTRUM, the standard for collection management. The support for SPECTRUM is currently being implemented in Primus.

The CMS can handle several collections and sub-collections, and also has a handy folder feature that enables group actions.

The screenshot shows a Windows-style application window titled 'Gjenstand: KIT.2014.002 - Vifte - Del av gjenstand'. The interface is divided into several sections:

- Header:** 'Gjenstand Rapport Rediger Navigering Vinduer Legg til i mappe Hjelp' with a toolbar of icons.
- Object Information:**
  - Vifte**
  - Fra: 1999 Til: 1999
  - KULTURIT
  - KULTURIT ANS
  - KIT.2014.002**
  - Enkeltgjenstand
- Classification and Description:**
  - Betegnelse:** Vifte
  - Emneord:** Elektrisk utstyr
  - Presisert betegnelse:** (empty)
  - Alternativ betegnelse:** FRI : Fjernkontroll, MOD : Flowerpower, FRI : Del av gjenstand
  - Klassifikasjon:** Luftkondisjonering [Outline-->Varme og lys]
  - Egennavn / tittel:** Flowerpower (produsents tittel)
  - Stil/ Periode/ Gruppe/ Bevegelse:** (empty)
  - Varemerke:** (empty)
  - Stil/ Periode/ Gruppe/ Bevegelse - kommentar:** (empty)
- Navigation:** A row of tabs: Klassifisering, Gruppering, Historikk, Motiv, Beskrivelse, Referanser, Opplysninger, Rettigheter, Administrasjon, Utstillinger.

### → Primus in use

As the software was basically designed in the nineties, the overall look and feel of Primus is old-fashioned, with a steep learning curve. Users normally need specialized training to operate Primus. However, once in command of the program's abilities and utilizing the tailored interfaces and shortcuts, the CMS is quite efficient in use. The next version of Primus (also referred to as Primus2 or PrimusWeb) will run in a web interface using a browser.

The interface can seem intimidating with a wealth of different fields to choose from. This screenshot shows the registration card for an object. Each of the ten tabs includes multiple fields. However, there is a simplified mode that will only show the most common fields to the registrant.

KulturIT regularly offers training courses in the use of Primus. The value of this training is more than just acquiring technical insight, it also helps in adopting best practices in registration work. Most collection care workers in Norway have received this kind of training, as it helps in bringing professionals together in a field where many work quite alone in a decentralized museum structure in Norway.

In a survey done in 2014, the Norwegian Arts Council asked professionals about the use of Primus. In this survey, 38 % of the respondents characterized Primus as «not very user-friendly», while 32 % considered it as user-friendly. The problem with the learning curve is evident as the more experience a user has, the higher score in user-friendliness. 57 % of the respondents are satisfied with the system, while 17 % express dissatisfaction.

### → Technology

The basic architecture of Primus was defined in the mid-1990s, with the use of Oracle database server and client, and the Delphi programming language as key components. This was a sustainable choice in the nineties, today, however, it has become quite rare architecture. To enable future development, KulturIT has chosen different architecture for the new modules, which relies on web based technologies, and the existing modules will in the future be adopted to this technology, known as PrimusWeb.

The software relies on the users being connected to the same local network. For museums spanning multiple locations (as most Norwegian museums are), the solution is to run the software in a remote desktop environment. This works fine for most of the tasks, but presents problems when working with images or other media.

Primus runs only under Windows, and there is no Mac or Linux support for the system. Museums using other OSs than Windows must therefore run the software in the remote desktop environment.

## • Digital Museum

### → Digital Museum in use

Digital Museum [[www.digitaltmuseum.no](http://www.digitaltmuseum.no)] is a public portal to the museum collections managed in Primus. It currently offers three search modes:

- a simple search interface – a search box
- a combined theme, place and dating search
- a more sophisticated search module combining all searchable fields such as owner, technique, licence etc.

Digital Museum also offers a map interface where geolocalized objects are plotted, and a timeline function spanning from neolithic finds until present-day acquisitions.

Today, the database contains close to two million objects from 186 different collections. As mentioned earlier, there are a few important collections missing, especially from the art museums and the university museums.

An interesting feature of Digital Museum is the user's ability to create their own digital collections from the troves of the Norwegian museums. Using this tool, you can assemble objects you want to revisit later, or publish them as «folders» for other users to see.

When showing a particular object, DigitalMuseum will present the available photos of the objects with different tools for zooming/browsing, and display the metadata that is chosen to be published in Primus. The data is enriched by retrieving relevant articles from Wikipedia relating to information in the metadata. User interaction is encouraged both by the possibility of additional tagging of the object, and commenting on the particular object.

There has been an exponential growth in the use of Digital Museum. In the period from its launch in 2009 until today, the number of visits to the Digital Museum has grown from around 80,000 to more than 2 million visits today. Surveys have also been carried out for the users of Digital Museum, showing a high regard – and much higher than of Primus – for Digital Museum, with 87 % of the respondents expressing high satisfaction. The survey also shows that users want to interact – about 27 % of the users have added information about objects or left comments to visited objects.

### → Technology

Digital Museum searches a combined database of the different Primus databases, called DiMu-store. In the Primus databases, the museums have the possibility to choose which objects to publish on the web, and a subsection of the metadata is exported to the DiMu-store. The store also contains user-created narratives (DigitalStories) and geo-localized information about cultural heritage sites (CulturePoints).

From the DiMu-store the public gets access to the Digital Museum web site. KulturIT also offers APIs to the DiMu-store making it possible to include data from the collections in other web applications, such as Norvegiana and further to Europeana.

### Sources

The Norwegian Arts Council: *Digital infrastruktur for museer*. Oslo, february 2015.



Per Øyvind Riise

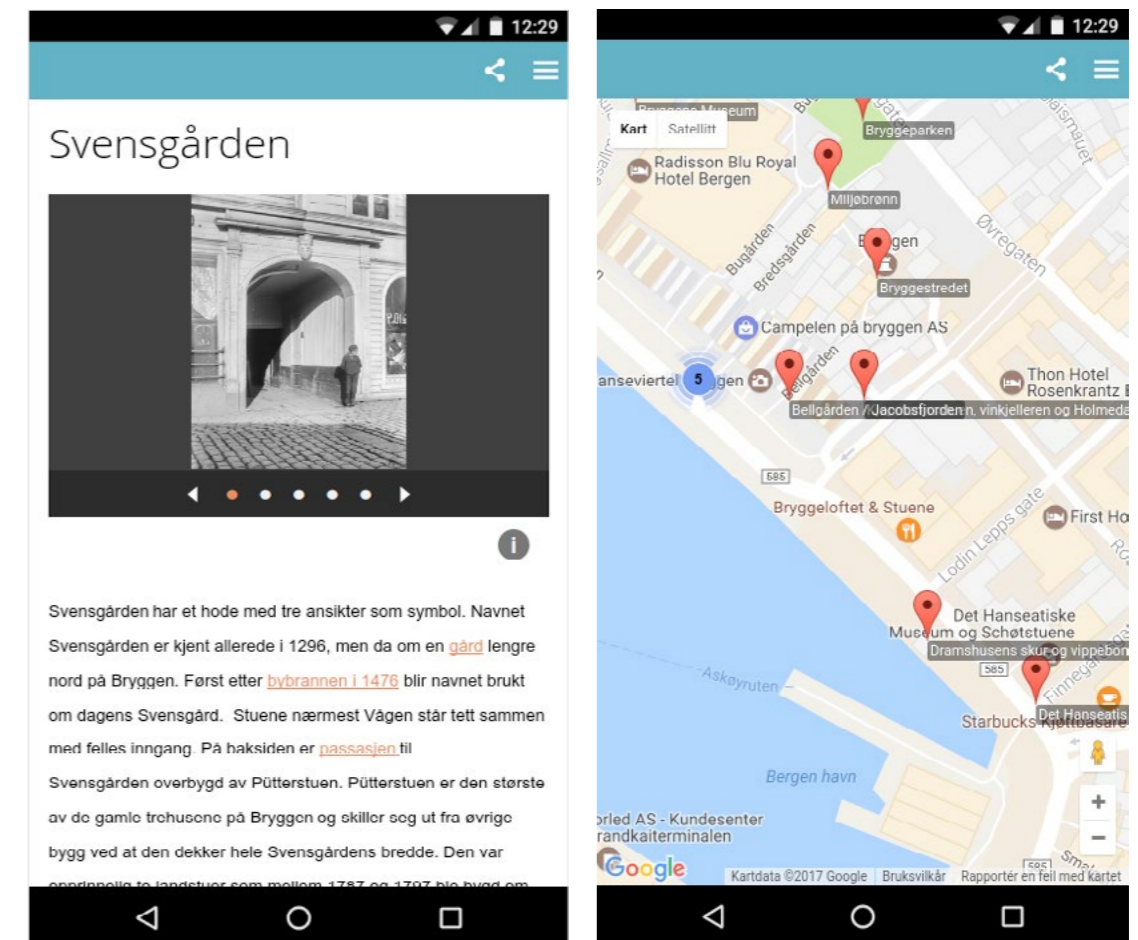
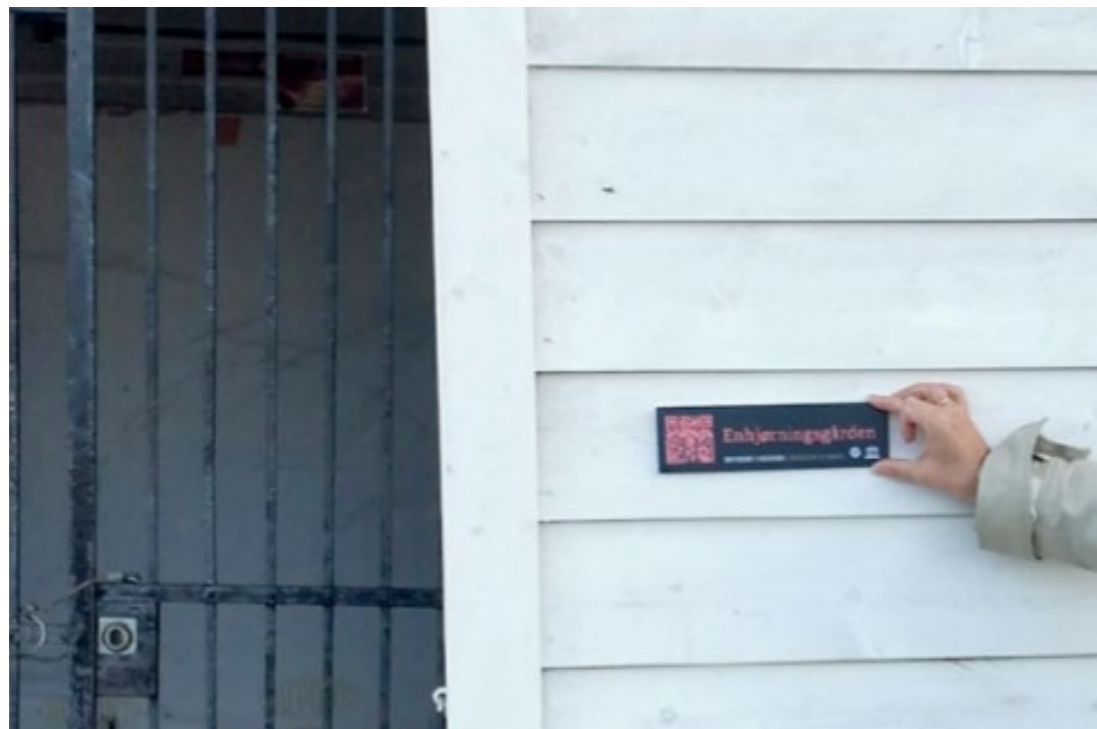
# Mobile applications

One of the most important trends in the digital use of museum collections in the last few years is the growth of mobile applications. Since the first attempts around 2011, their number is growing steadily, both in terms of apps developed by museums as mobile guides in the museums, and apps using data from Norwegian museums, for example the Digital Museum. We will present three different mobile applications here from Bergen and the surrounding region.

- «Bryggen i hånden» –  
Bryggen in Hand

Bergen is home to the UNESCO world heritage site of the old German wharf (Bryggen) in the centre of Bergen. The site consist of buildings remaining from the Hanseatic trading offices – storehouses, offices and living quarters from the Hanseatic period dating from the 14<sup>th</sup> to the mid 18<sup>th</sup> century. The facade of the wharf is the most iconic motif from Bergen, but more precise knowledge about the different buildings has not been easily available neither to the local public nor to the tourists. To amend this, the Bergen City Museum and Museum Vest initiated a project to create a digital guide to different sites within the Old Wharf in 2013.

At the same time the museums in Bergen were looking for technological solutions to producing a digital guide, the makers of Digital Museum – KulturIT – were working on a solution for a group of museums. They already had a pilot version working, and were working on the first stable release for a product called KulturPunkt (*CulturePoints*). The idea was to focus on creating long term support for the content, with simpler tools for giving access to the data on mobile devices and in kiosks. The solution also offers access to the information on the web, and APIs to offer the same information to other apps or web sites in the future.



The use of «Bryggen i hånden» requires a mobile data connection, and uses QR codes to give access via the mobile device's web browser. Today, the willingness to use mobile data increases as the prices decrease, and for locals this is no longer a concern. Also for international tourists, the use of online services through mobile data connection is becoming more and more common.

The QR codes were implemented in the general design of new signs on Bryggen, to merge with existing information on the site. The signs with the QR codes are without any instructions, using the code itself as an international sign of the possibility of in-depth information.

By scanning the code, the phone will open a web browser to visit the URL indicated by the QR-code. The web page will give you more information about the building where you are located, along with archive photos where available. From your phone, you can browse the other plotted points through lists or maps.

The system supports other location-based methods besides QR-codes, such as iBeacons. KulturIT has also launched a beta version of an android app

giving full access to KulturPunkt in Norway and Sweden, using the devices' capacity for integration and localisation better than what is possible as a web page.

The museums' evaluation of this service is similar to the other apps presented later. There still seems to be a lot of input for a use that is still hard to measure. More thorough user statistic analyses have not been carried through yet. In this case, the museums will also incorporate the information from the app in kiosk solutions in both Bryggens Museum and the Hanseatic Museum – giving the information another use and added value.

Another specific problem with the solution chosen for this application, is the lack of a pre-installed QR-code scanner on many android devices. If the users have used their cell phones before to scan codes on posters or in adverts, they will know what to do when seeing a QR-code. Other users may not know what the symbol signifies, and not know how to install a QR-code scanner on their device. With a stand-alone application as the one being tested out by KulturIT, the scanner will be implemented in the app.

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### Facts about «Bryggen i hånden»

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**PUBLISHER:** Bergen City Museum and Museum Vest

**PRODUCTION:** KulturIT

**WEB ADDRESS:** <https://kulturpunkt.org/owner/64/group/242/record/3431>

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**PLAY STORE:**

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- **«Sølvskatten» – The Silver Tax**

After the foundation of independent Norway in 1814 (although shortly followed by a royal union with Sweden), the newly established Norwegian Central Bank (Norges Bank) tried to establish its first reserves by a volunteer purchase of shares from the citizens of Norway. This did not work out, and in December 1816 the government decreed that the reserve should be raised by a forced payment in exchange for shares in the bank.

Bergen was the biggest and richest city at this time, and much of the reserve was collected here. One of the most common ways of contribution was by handing over objects of silver or gold to the bank – hence the name “The Silver Tax”.

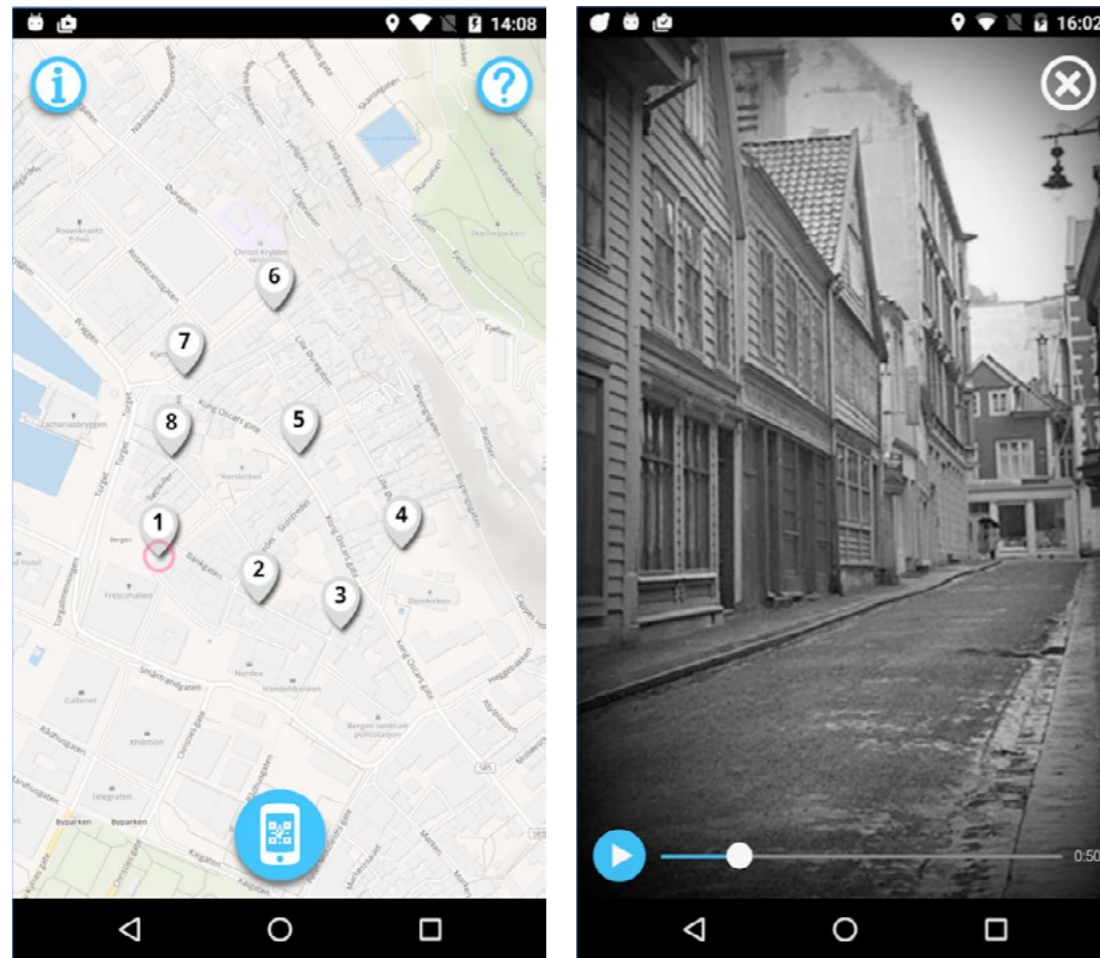
200 years later the Norges Bank commemorates this anniversary in cooperation with the National Archives and two museums in Bergen. The Archives got funding for digitizing the list of contributions in 1816–18, and the art museum of Bergen – KODE – got funding to exhibit many of the objects collected 200 years earlier. Most interesting here, though, is the creation of an app telling the story of the “tax” in the streets of Bergen, produced by the Bergen City Museum.

This time, the museum opted for a different strategy than with “Bryggen in hand”. Instead of relying on the web browsers on the public's cell phones, the museum partnered with a college-based IT-development firm, *Center for new media*, to create an app.

The app *Sølvskatten* was launched in September 2016 on Android and iOS. The app will guide you on a walk through the streets of Bergen, meeting some of the merchants and traders who contributed to the reserves. The tour lasts about 45 minutes, and communicates through sound bits – one of the museum's actors giving voice to different characters of the time.

The app still uses QR-codes. When reaching a spot marked on the map, the app scans the code and triggers the next event in the app. The choice of QR-code was made because of its reliability in case of rain, which can be a problem for bluetooth beacons – especially in Bergen.

As the app uses a lot of data in its focus on multimedia, the strategy was to choose an app which also downloads the media content while on cheap high speed wifi, as opposed to streaming sound on mobile networks. This of course has the flip side of being a space consuming application on smartphones, but with full control of the quality of the media.



### Facts about «Sølvskatten»

**PUBLISHER:** Bergen City Museum

**PRODUCTION:** Center for new media

**PLAY STORE:**



**APP STORE:**



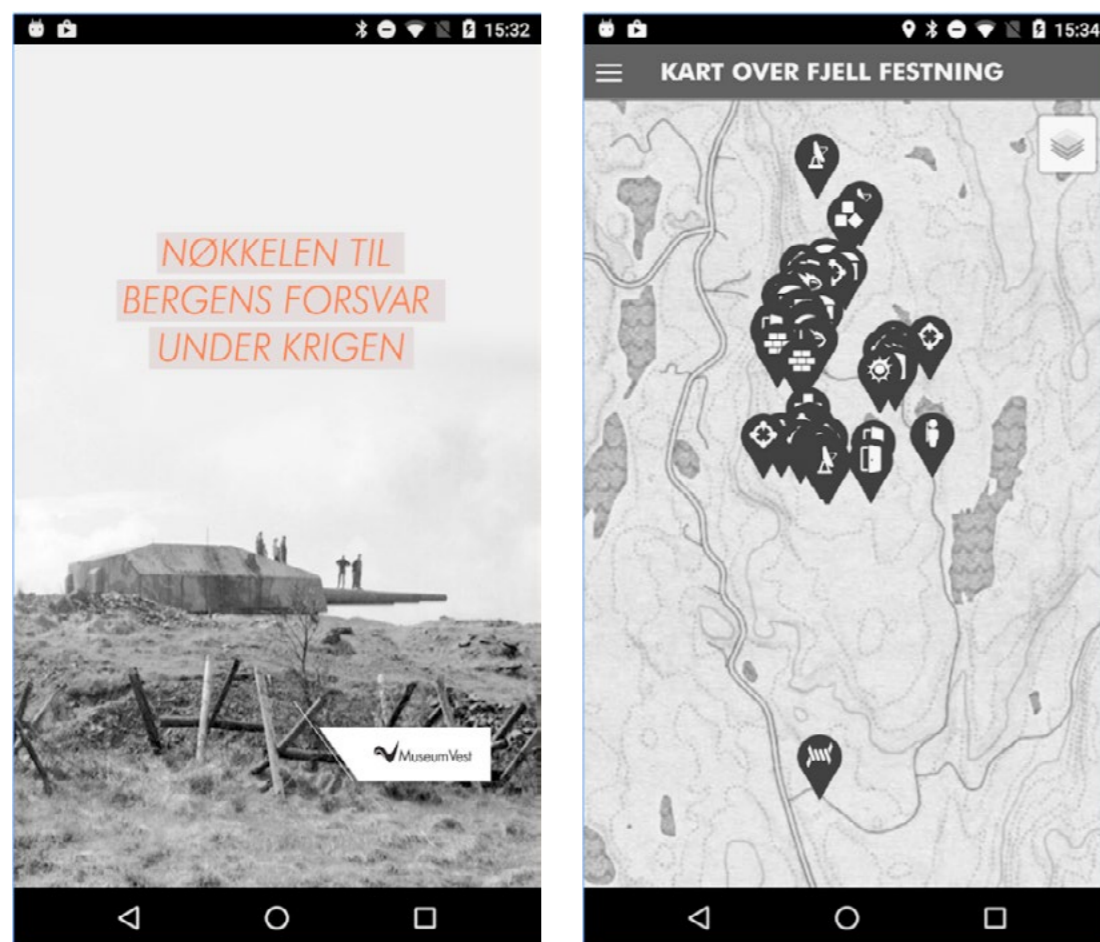
**SØLVSKATTEN**  
**1816**

One of the main concerns of the museum after the launch, was how to make people aware of the app. With no marketing budget, the spread of the app is more or less dependant on people finding it themselves. This would happen by noticing the signs with QR-codes in the center of Bergen, but the size of the app makes it less likely for people to spend time and bandwidth to download the app when passing a sign. So far, the museum is satisfied with the quality of the app and the ability to share the wonderful stories with a broader public, but with concerns of too few downloads of the app.

- **«Fjell festning» – The Fjell fortress**

The Fjell fortress was a significant part of the German defense of the Norwegian coast line during the war. Constructed between 1942 and 1943, the fortress consists of several installations over ground, as well as kilometres of tunnels and halls under ground. The fortress controlled the main naval entrance to Bergen from its elevated location on the island of Sotra outside Bergen. The fortress is today a museum operated by Museum Vest, and the surrounding area is a popular recreational location.

There is, however, very scarce information provided outdoors to indicate the history of the many constructions and remnants of past activities. To give the public a better experience and to provide knowledge about the constructions and the history of the fortress, the museum decided to create a mobile application



with location-based information to enhance the experiences of its visitors. The museum chose the *Center for new media* as a provider, and with funding from the Arts Council, the app was launched in 2016.

The app uses GPS positioning to provide location-based information about different spots outdoors in the surrounding terrain. So far, close to 50 sites have been added to the app, spanning from road constructions and foundations of former buildings, to still existing bunkers and houses. Originally, the app was also intended to give information about indoor and underground facilities using bluetooth technology (iBeacons). This is now being implemented in a new app, available to use only on the tablets provided in the museum.

When starting the app, the user is provided with a map interface making it possible to use it not only at the museum, but also as a source of information and for planning a visit to the museum. The information is only available through the mobile application. Different types of markers on the map indicate different types of sites, such as bunkers, fortifications, entrances to the tunnel system, etc.



By clicking on the marker, the app presents photos, illustrations and videos in addition to text. The app also provides visitor information such as opening hours and contact information to the museum.

The museum is very satisfied with the application, and for the curator of the museum it has been a rewarding experience to produce location-based, concise and media-rich information to be used in the app. The format forces a simplification of a traditional academic presentation, giving priority to covering a larger number of spots, and a rediscovery of the cultural landscape above and around the fortress. On the flip side of the experience is the problem of promoting the app – the number of downloads is still lower than wanted.

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### Facts about «Fjell festning»

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**PUBLISHER:** Museum Vest

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**PRODUCTION:** Center for new media

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**PLAY STORE:**



**APP STORE:**



Jacek Świdorski, Karol Kowalik

# From Documentation to Digitization – Experiences of the National Museum in Krakow



- **A brief history of the studio**

The beginning of the digitization process dates back to around 2005, when the first digital camera with 6 megapixel matrix recording the image appeared in the studio. At that time, the studio employed 5 workers and was situated on the ground floor of the main building. The premises included a small atelier, two dark-rooms and a utility room. The studio mainly dealt with creating reproductions for the purposes of the Museum branches, and for a few external publishing orders.

In subsequent years, the studio was gradually being equipped with devices that could meet the technological requirements of correct reproduction of works of art. The first goal was to replace the analog photographic technology based on chemical system with the digital system.

In 2006 and 2007, the equipment was enriched with devices with full-frame matrices (12 m. pixels) and flash illumination equipment. The location of the studio also changed. Currently, the studio covers several interconnected rooms with a total area of 230 m<sup>2</sup>.

Finally, in 2010, the studio was equipped with the devices that are still in use, namely cameras with 21-million-pixel matrices. Thanks to that, the standard of reproductions improved from the minimum to the recommended one. Changes in the studio are caused by rapid technological progress and increased demand for reproductions. In 2006, the number of orders reached the level of around 400, while now the number of orders is approximately 1,300 per year, with around 1/3 of them being publishing orders.

In 2011, the implementation of the first digitization project “Digital Cultural Heritage” started. The photographic studio was enlarged with additional rooms for the planned digitization. Three new job positions were created.

One of the principles of the project was to perform digitization with the highest possible technical parameters so that the obtained images could meet high quality standards for various purposes (research, publishing, conservation), and to avoid multiple photographing of the objects, which happened while making documentation at low parameters.

Another task was the selection of highly compatible equipment, which would allow for significant savings (e.g. one set of lenses can be used on multiple workstations).

The basic digitization tools for all projects are medium format cameras with digital attachments. As a result, high-resolution reproduction has been achieved with maintaining high conformity of colours.

In 2011–2013, in the framework of the program “Culture +”, the studio was equipped with new elements for digitization equipment (including high-power flash illumination, a device for scanning library objects using a photographic method and a device for the digitization of negatives and flat objects).

Currently, the digitization studio has 4 independent and compatible workstations for reproducing all kinds of objects, and the quality of the obtained images fully meets all digitization recommendations.

- **Organisational principles and action plan**

The concept and programme principles for the digitization system were created in 2010. At that time, the operator of digitization programmes did not make any guidelines for the digitization process available. The programme principles for the Museum had to be developed internally from scratch. The most important of them are listed below:



→ **Interchangeability of workstations**

The studio currently employs 9 people. Tasks are divided into photographic documentation, digitization and graphic processing. The studio staff is comprised of role-specific educated photographers and graphic designers. Workstations are not assigned personally so that you can smoothly swap responsibilities, and in the case of unforeseen random accidents replacement of the absent person does not pose a threat to the execution of the project.

→ **Division into documentation and digitization**

All objects delivered within the framework of projects implementation as well as objects after conservation and large objects are subject to digitization.

All objects from internal orders, objects before conservation and newly acquired objects are subject to documentation.

**→ Quality**

Adequate equipment of all workstations made it possible to determine appropriately high parameters of reproduction quality. Currently, the minimum size for the target files from miniature cameras is 4,000 pixels and from medium-format cameras – 7,000 pixels on the longer side.

**→ Compatibility of equipment**

Documentation of visual objects is carried out with the use of cameras Canon Eos Mark 2.

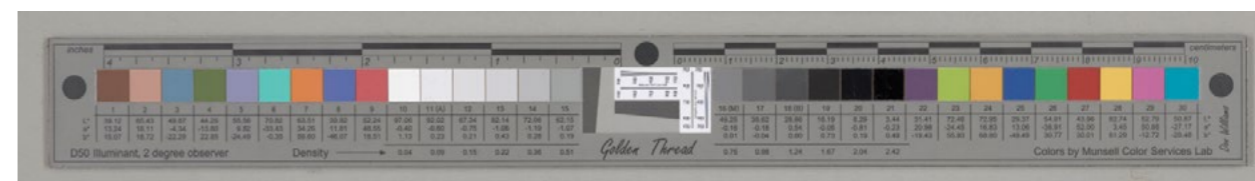
The standard equipment includes 3 such devices, which were additionally equipped with light generators Bowens. The whole is comprised of 3 independent but identical sets, allowing for fast and trouble-free realisation of a variety of photographic purposes. The base of lenses and lighting accessories is compatible within the 3 workstations, which makes it really convenient in use.

Digitization is carried out with the use of medium-format cameras Phase One and flash generators Broncolor. In this case, the compatibility has also been achieved on all 3 reproductive workstations and 2 scanning workstations.

**→ Graphical processing and closing process**

The photographic studio makes reproductions only according to the internal procedures. RAW image files are delivered to the 2 graphics workstations, where a standardised post-processing and numerical description of files takes place. Graphic designers are thus responsible for preparing the parent file as a dng, and the master file as a jpg without compression.

This is where the role of the photographic studio finishes, as the person responsible for storage and further description of images is the Deputy Chief Cataloguer.



- **Technology and FADGI**

Over the last 5 years, the photographic studio was involved in several major digitization projects, which made it possible to achieve an appropriate technological level, and clarify the process. Equipment selection was conducted in accordance with the highest available equipment parameters. As a result, the current equipment base includes 6 Phase One systems with 80 Mp (megapixel) matrices. The equipment is uniform and allows the production of files based on 10,000 pixels in each of the 5 workstations, while the image quality in the whole digitization process is the same. In order to be able to maintain high parameters of files, it was necessary to equip workstations with adequate lighting, ensuring high and stable flash power, and most of all, a constant temperature of light colour. After many tests of various systems, we have decided to choose flash generators Broncolor.

In order to be able to control and properly verify reproductions, in 2014 we implemented a system created by an American company ISA (Image Science Associates) to determine the compliance with the FADGI standard.

FADGI is the only written and binding standard for digitization systems. The use of ISA tools allows us to confirm the level of quality in terms of resolution, contrast, colour saturation level, image noise level and focus. The confirmation of the level of all these parameters can be reached with the use of special software or on-line. The second option greatly facilitates the whole digitization process.





- **BC scanner**

Apart from our main studio in the main building, the photographic studio has a branch located in the Princes Czartoryski Library, where only library objects are digitized. The modernisation and purchase of a system for photographic digitization of books was an important achievement.

Since 2013, digitization has been done using the BC 100 scanner, where the devices responsible for obtaining the image are Phase One attachments, which makes it another compatible digitization system.



- **Negative scanner**

As mentioned earlier, the studio has recently implemented many digitization projects, and one of the most interesting was the project related to old glass photographic negatives. The implementation of this programme was quite a challenge for us, mainly because of technological reasons, but also sentimental ones.

Fragile glass negatives should be digitized with the use of minimally invasive techniques and high resolution that would retain their excellent quality. For these reasons, we have abandoned the problematic system scanners. For the needs of the project, special DT-RCam equipment has been purchased and again the image has been registered thanks to Phase One attachment. The multinational combination of the equipment (the components are produced in different countries) has allowed us to achieve excellent quality, maintaining at the same time full security of objects.

- **Summary:**

After 6 years of arduous testing and various experiences, we can say that the photographic studio has reached a satisfactory technological level. We can boast not only about good results (about 25,000 objects and 80,000 scans per year), but also about a great team full of passion and commitment.

In the coming years, we will of course digitize more objects, but a new challenge may be the 3D technique or sharing and printing images directly in the photographic studio.

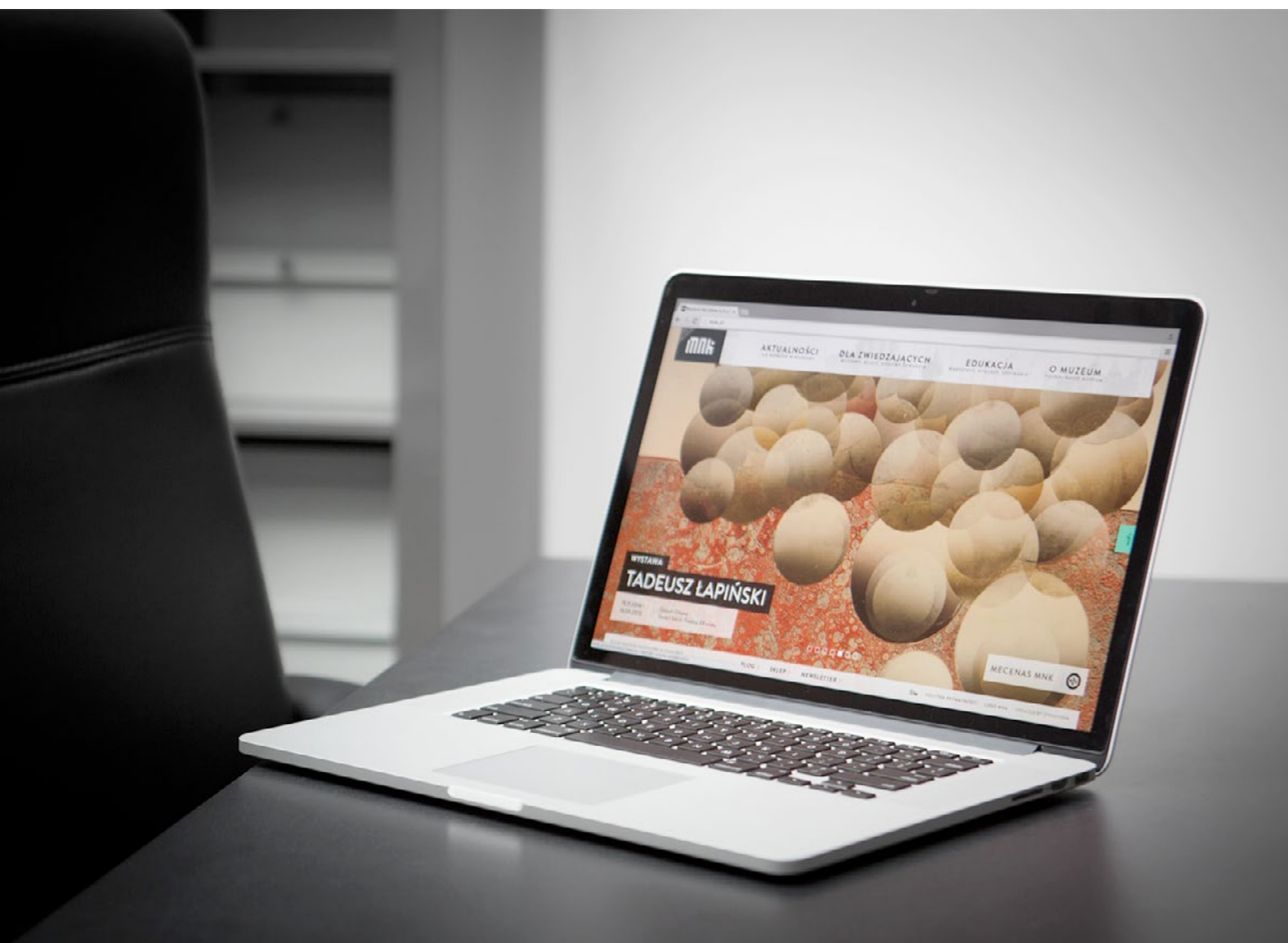




Magdalena Kuć, Michalina Pieczonka

# This Is How We Do It. Promoting Digitization in the National Museum in Krakow

Websites, social media, mobile apps – for the last few years these elements have constituted part of our everyday life and are difficult to escape. Cultural institutions, including museums, must embrace them if they want to be where their visitors are – both the existing and potential ones. These days, in line with the popular saying – “if you don't exist online, you don't exist at all” – it seems impossible to function without one's presence on the Internet.



- **Digitization and a New NMK Portal**

In 2012, the National Museum in Krakow decided to change its website since the previous one – created in 2009 as part of the EU “SMART” project – no longer met the requirements of contemporary Internet users and stopped responding to the rapidly changing trends. In order to maintain our high position among Polish and European museums, we had to rethink the strategy of our online presence. One of the main goals which we set ourselves in the construction of the new portal, and which became a guideline for our designers, was the presentation of our collection (including those objects which are normally kept in our storerooms).

It is the heart of every museum so we wanted to present it in the most modern, visible and friendly way to the Internet users. It was also impossible to ignore because of the number of the digitization processes which were in progress in our museum at that time. The need to digitize and share our museum collections on the Internet was recognized relatively early, though the implementation of the first major projects took place as late as in 2010. Works on creating “Lotus” – the electronic database of objects – had begun ten years earlier, which meant that the NMK became the leading Polish cultural institution in this field. Our initial activities in the field of digitizing and sharing our collections could not be considered a success, mainly due our financial constraints. Fortunately, the following years brought more opportunities to apply for EU funds for these purposes, which resulted in a considerable improvement both in terms of the digitization process itself (modernization of the NMK Photography Studio by equipping it with top-quality equipment) and the quality of reproductions of works of art from the Museum collection available online. What the Museum currently shares online (as photo galleries or as individual reproductions of works used in social media) is based on reproductions made according to the highest global standards. More information on the process of digitization and the projects that the Museum has carried out in the last few years can be found on a specially prepared website: <http://digitalizacja.mnk.pl/>.

Thanks to the ongoing digitization process at our Museum and access to high-quality images of objects, the main emphasis in the New NMK Portal was placed on the best possible presentation of our collections, also due to our continued works on the digital directory of exhibits. We decided to design our homepage on the basis of a large slider where we could present our collections in form of individual large images and specially prepared animations. The other major element – when it came to the presentation of collections on the museum website – was the creation of photo galleries. There, in addition to reports from events taking place in our branches, we often publish specially prepared and selected thematic photo galleries accompanied by detailed descriptions and commentaries by our museum experts, including curators and custodians. This is where we present works by our visitors' favourite artists such as [Stanisław Wyspiański](#), [Zofia Stryjeńska](#), [Józef Mehoffer](#) or [Władysław Podkowiński](#).



- **Unusual Dose of Art**

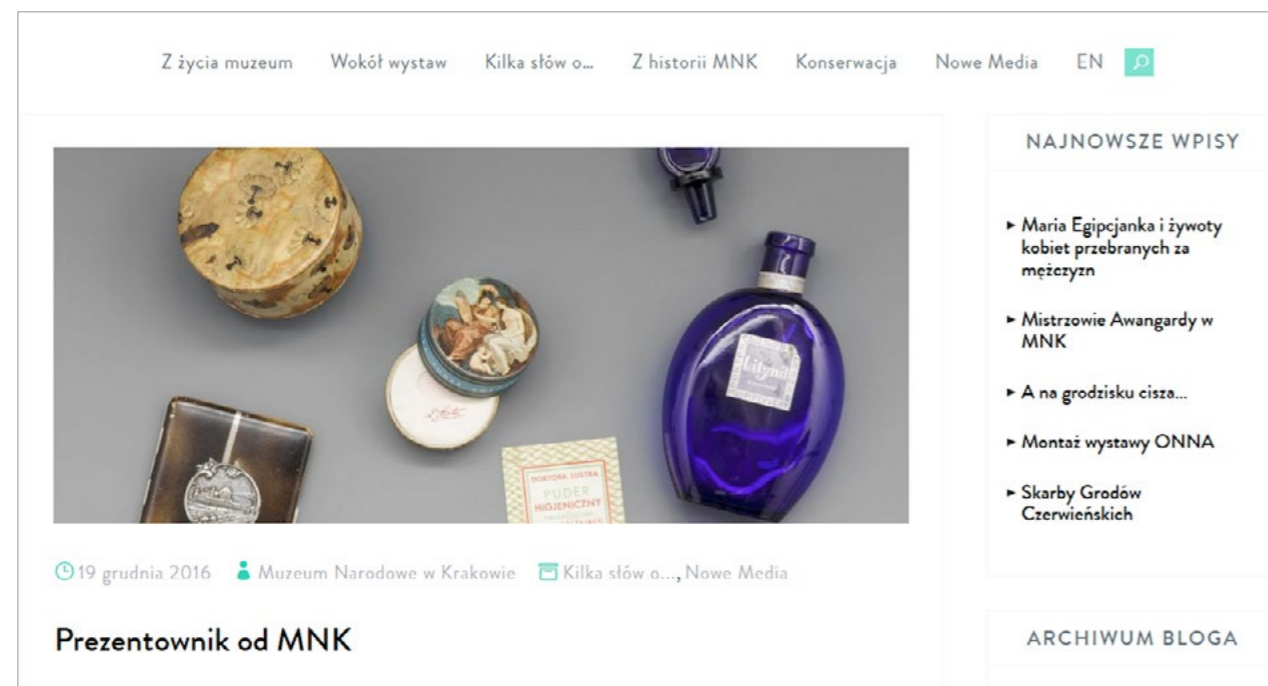
In order to present the collections of our Museum, various popular social media – in which the NMK has been present for a few years now – are also widely applied, including primarily [Facebook](#), [Twitter](#), [Instagram](#), and [Pinterest](#). Particularly for this reason, in 2015, we launched a series titled “Unusual Dose of Art”, which involves publishing works of art from the Museum collections accompanied by a short commentary and a full description of the work including the dates of birth and death of the artist, date of creation, material it is made of, and the department of the Museum where the object is located. From its very beginning, the series has enjoyed great popularity among our followers, which resulted in a significant increase in the number of NMK fans and followers of our profiles in social media, and greater recognition of works that make up our collection. The selection of the works we publish is dictated both by current events (exhibitions, meetings, workshops), dates of birth or death of the artists whose works we possess in the NMK collection, as well as by everyday contexts such as the changing seasons, major sporting events or important events in the life of Krakow. To make it easier for the users to filter our content, each publication is accompanied by a corresponding hashtag e.g. [#unusualdoseofart](#), [#collections](#), [#NMKcollection](#). The hashtags are used in activities involving all the social media that the Museum is a member of.



- **“MUSEUM GUT” – the Museum Blog**

Another channel used for displaying our digitized collections is our museum blog called “Museum Gut”, which is intended as a place where we can present the museum that is normally inaccessible for visitors. The things that are on the other side of the gallery, that happen before a painting is placed on a wall, before we open an exhibition... But not only that. The NMK blog also features texts which analyse objects from our collection. They reveal the artists' inspirations and tell interesting stories related to their origin or former owners. Each entry of this type features a photograph of the exhibit. There are also plenty of notes presenting the artists themselves and their creative paths. In addition, we publish thematic texts e.g. on conservation, in which we present the long process that an object has to go through before it gets its second life. Such presentations are accompanied by photographs of its state “before”, “during” and “after” the conservation process.

Great popularity among our followers is enjoyed by our blog entries published on special occasions such as various historical anniversaries or holidays. Their authors are able to find real “gems” in our collections, which makes it possible for us to present our readers with attractive materials, e.g. at Easter, Christmas, or Valentine's Day.



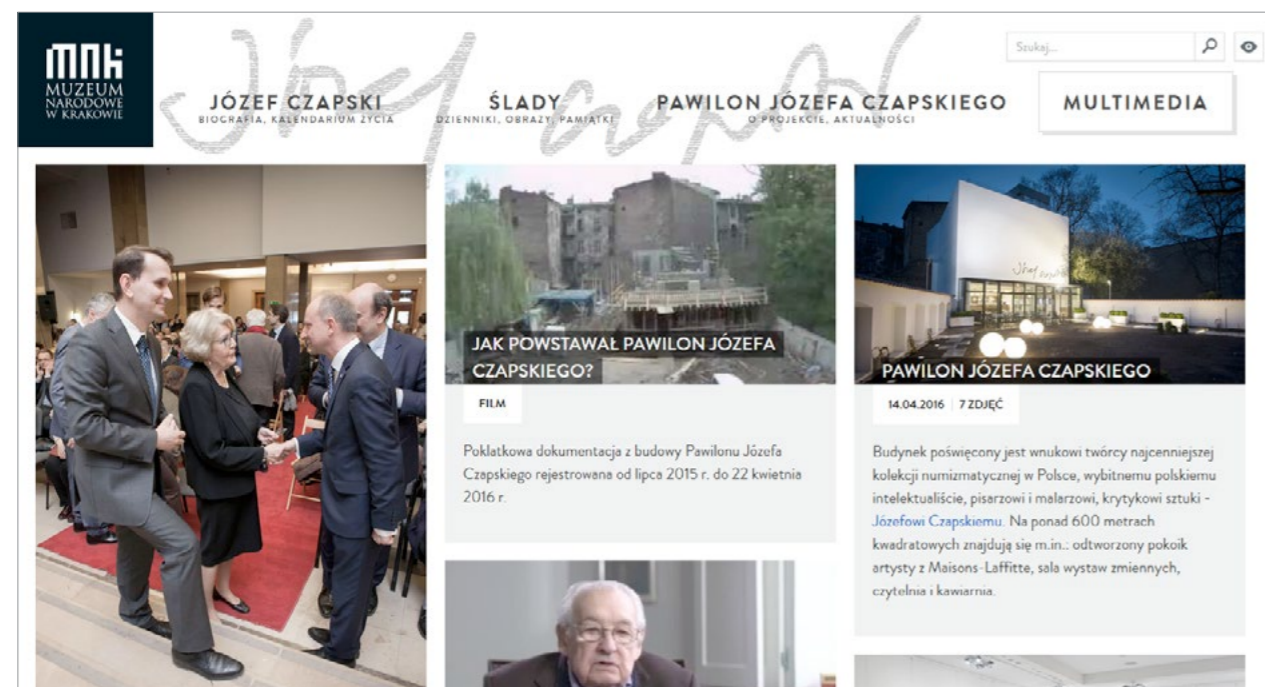
## • DailyArt

For some time now we have been cooperating very closely with the creators of the DailyArt app, which is an app for [IOS](#) and [Android](#) devices that every day at the same time publishes one work of art along with some connected trivia. Each work of art is additionally promoted in the social media, where the DailyArt app has its official profiles. There's also an option of sharing selected objects directly from the app to users' private social media profiles. All entries are in English.

## • Wikipedia, Europeana

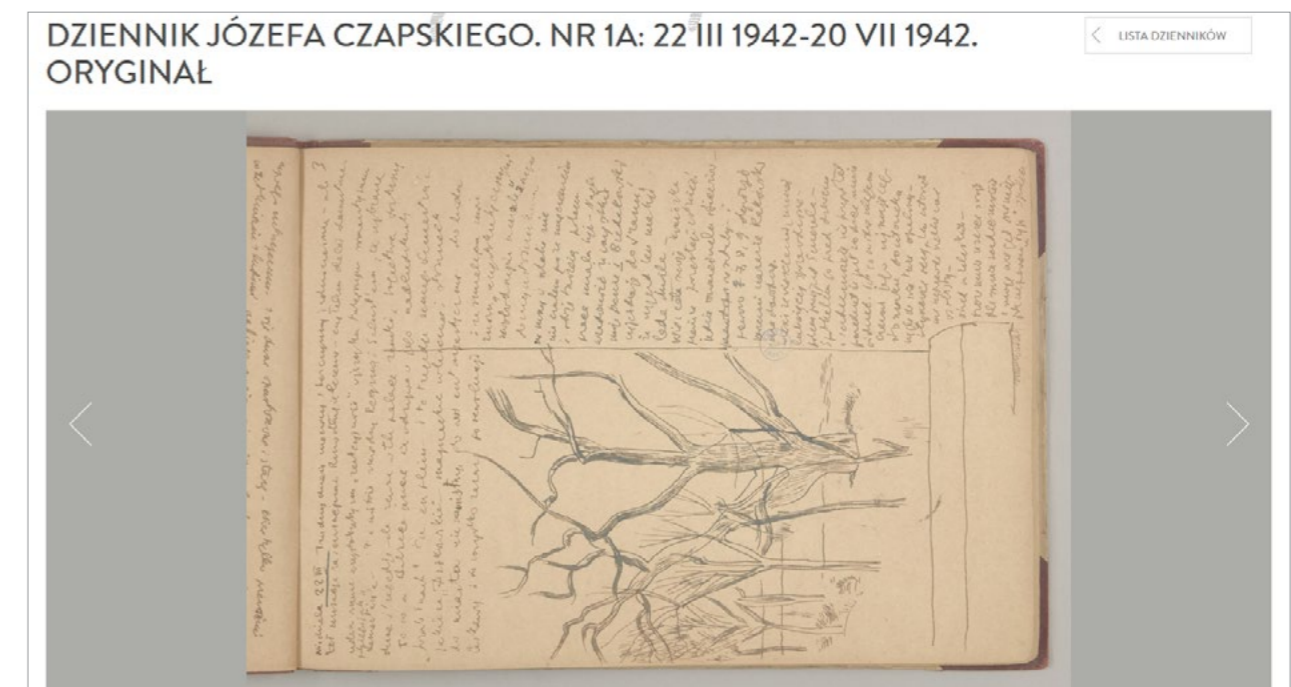
One important aspect of promoting our digitized collections is the cooperation which we have started with two major platforms – Wikipedia and Europeana. For some time now, Wikipedia has been developing its “GLAM-Wiki” initiative, which involves cooperation of cultural institutions with Wikipedia and other Wikimedia sites. Thanks to this project, cultural institutions have the opportunity to easily share their collections and academic materials with people all over the world, thus enriching the open resources of public knowledge. Initially, our cooperation will result in sharing our knowledge of one of the most respected artists in Krakow – Stanisław Wyspiański, whose exhibition will open at the National Museum in Krakow in November 2017.

We also cooperate with the Europeana portal whose main objective is to share the European cultural and scientific heritage. Europeana also functions as a digital library, a virtual museum and archive, and works with more than 3,000 cultural institutions throughout the European Union.



- **The Czapski Pavilion and a Link to the Project Landing Page**

One of the most important digitization projects recently carried out at the NMK was conducted as part of the “Construction of the Józef Czapski Pavilion at the NMK” investment project. We have partially digitized the library and diaries of Józef Czapski (c. 49,000 pages) as well as personal memorabilia and furniture of the artist. Most of the materials were used while creating the Józef Czapski Pavilion's permanent exhibition, and were made available online on a specially prepared website: <http://czapski.mnk.pl/>.



- **3D Print**

New technologies also come to our rescue in creating interesting museum lessons and protecting works of art. Our observations and surveys show that visitors to our museum very often lack, especially in contact with the sculptures, the possibility to touch them, to feel the texture of the material the sculpture is made of, to trace its folds and to follow the artist's hand movement. Until now, we have had several minor projects (the most recent one being the exhibition “Rodin/Dunikowski. Visions of Women” in October 2016) designed for the visually impaired, in which those visitors had an opportunity to get acquainted with works by both artists in a tangible way, with the help of specially prepared castings of sculptures. The museum's purchase of a 3D printer gives hope to expand and diversify our educational offer, to present three-dimensional works on our website or in the digital repository, as well as to boost the sales of museum souvenirs based on high-quality reproductions and prints.

# Contact us

Dear Reader,

Do you have any questions?

Is there any suggestion concerning the broad topic of digitalisation and dissemination of the digitalised heritage you would like to share with the authors of this Brochure?

We would appreciate your feedback.

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An important element of the project development was the study visits to all partner countries. The meetings with cultural organisations and museum's staff allowed us to learn more about needs and methods implemented by the local cultural organisations in terms of digitalisation and dissemination of digitalised heritage objects.

During those visits we met many people devoted to the work on securing the sustainability and promotion of their national heritage whom we want to thank very much for their hospitality, inspiration and the time spent with us.

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**Sabina Negele** SECRETARY (COORDINATION OF PROJECT ACTIVITIES IN LIECHTENSTEIN)

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**German Foser** MUSEUM TECHNICIAN

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**Markus Burgmeier** HEAD OF THE ALTER PFARRHOF

**Dorothee Platz** HEAD OF THE NATIONAL ARCHIVES OF LIECHTENSTEIN

**Peter Niederklopper** TAXIDERMIST FROM THE LIECHTENSTEIN NATURAL HISTORY COLLECTION

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**Rune Kvam** EXHIBITION ARCHITECT (COORDINATION OF PROJECT ACTIVITIES IN NORWAY)

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**Knut Høiaas** MUSEUM EDUCATOR

**Nina Moldskred** COLLECTIONS CURATOR

**Baard Skogrand** SENIOR CURATOR

**Anne Mette Prestegård** EXHIBITION ARCHITECT

**Janicke Larsen** HEAD OF EXHIBITIONS & PUBLIC OUTREACH

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„Second life. Digitalisation and promotion of digitalised heritage via New Media – best practice exchange between museums from Liechtenstein, Norway and Poland” – International Project Team

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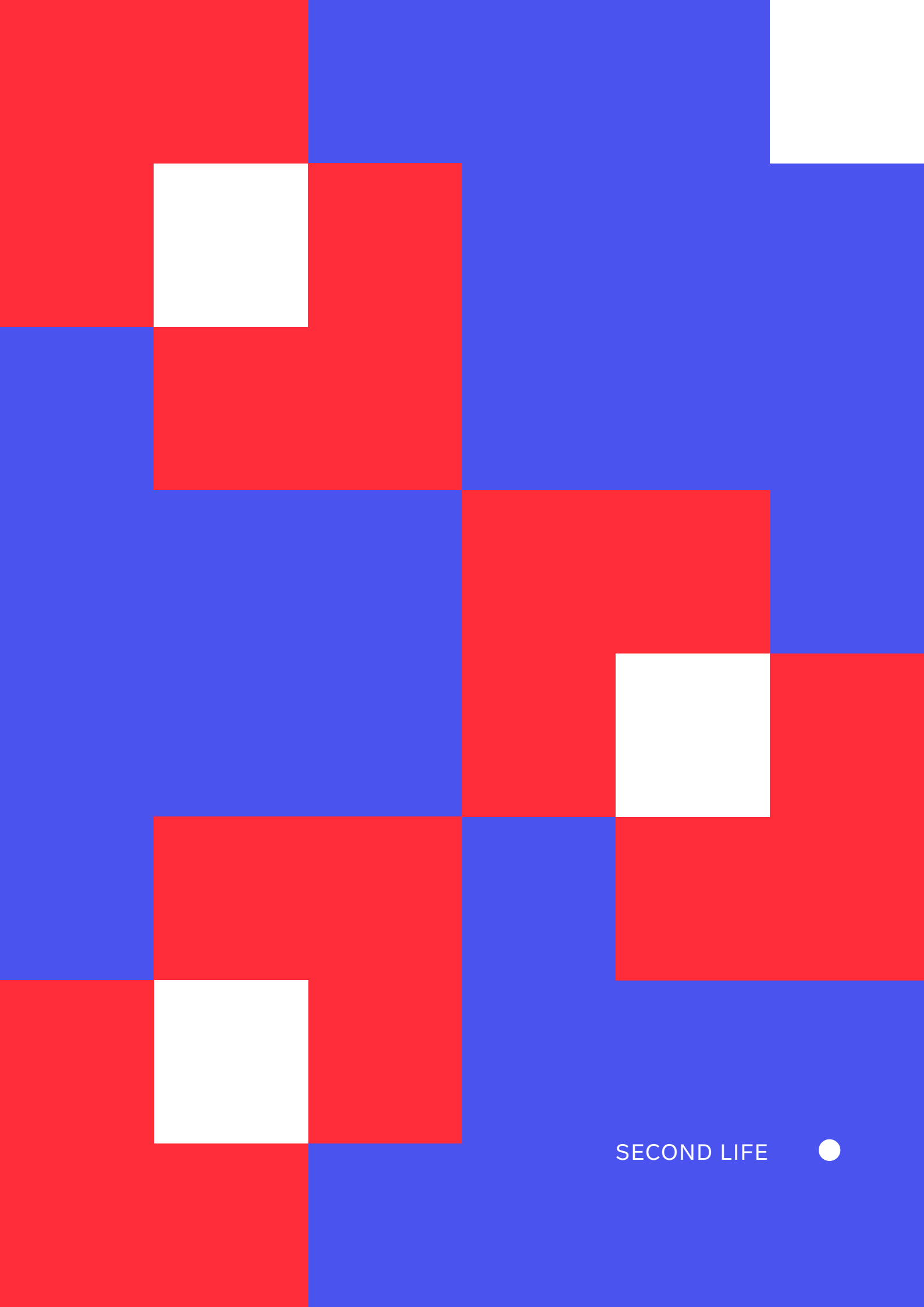
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SECOND LIFE

