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Preserving Irreplaceable National Digital Cultural Heritage in the Arctic World Archive

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Abstract

The Norwegian National Museum and Piql have collaborated on preserving some of the most valuable art history Norway has to offer. The project is the start of a global initiative aiming to protect some of the most valuable cultural heritage the world has to offer in a digital format. Safely secured on an Arctic island, the Arctic World Archive safeguards a copy of irreplaceable documents, drawings, sound pieces, pictures and movies, even databases or other types for format with significant heritage value.

Digitization and preservation at the new National Museum

One of the challenges the Norwegian National Museum has been facing over the last five years (as they are transferring into a digital institution) is how to overcome the challenges associated with digitization of a wide range of different and complex artefacts and safeguard for future generations.

In 2020, the National Museum in Norway will open its new 54,000 m2 magnificent new building by the waterfront of Oslo. A truly amazing opportunity for the museum to plan and prepare for being a modern national memory institution with an integrated experience between the digital and physical environments. In this context, the museum has for several years been working on revising the collections and preparing the artworks for making them available online, as well as having the opportunity to show movements and displaying the works in the new exhibition areas.

The National Museum's collections are broadly composed and consist of over 400,000 works containing painting, sculpture, installations, drawings, costumes, glass, ceramics, silver, design objects and architectural material. A very thorough process has been conducted to secure information about these works of art. The documentation of the artefacts has been revised and updated, conserved, photographed, digitized and packaged before being moved from the old to the new location.

The work on digitization and photography has been extensive and time-consuming. The photo department has adopted various photographic and digitization methods such as 360 ° photography, 3D photogrammetry, UV photography, and more general scanning.

All photography and digitization processes are performed with high end digital medium format cameras and scanners with optimum color management. All image files are archived with associated metadata that is retrieved from the collection database.

The core objectives for the digitization process were to not only to make the content accessible in a digital format but allow a new perspective on securing the information and documentation for the future. As a result, the museum saw that the digitization process also required approaches and strategies of a long-term digital preservation strategy.

Long-term digital preservation strategy

While starting the thorough digitization program, a strategic plan was initiated by the former CIO to make sure the digital assets were preserved in the right manner. As part of this process, a partnership with the National Library of Norway was established and a deposit of the archival material was made into a “bit bank” of the National Library as a secondary repository. Still, this was more of a temporary structure and the development of a long-term strategy of digital preservation of museum assets was begun. Through a thorough research process by the organization internally, and discussions with institutions externally, a list of 10 characteristics the National Museum found to be of utmost importance for our long-term preservation strategy were developed:

a) *migration-free* meaning that the information and technology should be kept in its original form and not be able to be altered or changed

b) *self-contained* meaning that the preservation strategy should secure that the content and retrieval process to be self-explanatory for the designated community of users both in the long-term future

c) *visual representation* meaning that ideally the digital information could also be documented in a human readable way, for interpretation and understanding of metadata as well as contextual relevance

d) *ensuring confidentiality* meaning that the technology would need to be able to comply with those confidentiality requirements that the museum would have to meet

e) *maintaining data integrity* meaning that the data integrity and authenticity under no circumstances can be jeopardized

f) *available on demand at safe location of own choice* meaning that it should be possible to physically store the information on a technology in a location that is completely safe and based on the choice of the museum

g) *proven technology* meaning that the technology used for this purpose should have been proven for this kind of task and have a documented lifetime

h) *safe from electromagnetic pulses* meaning that the technology should not be affected any sort of electromagnetic pulse attacks or be jeopardized in a time of warfare. This follows a traditional 3-2-1 strategy of storage mediums; at least to have information stored on three different copies, on two

different storage mediums and at least one offsite location that, ideally, is not affected by magnetic threats.

i) *low-tech* meaning that an ideal solution would not be too complex as it requires advanced technology to retrieve the information and thus becomes exposed of technological obsolescence. A low-tech storage solution should make sure that it would be possible to access and retrieve the information with simple means, also in the foreseen future.

j) *physical robustness* meaning that the storage medium should be robust and possible to withstand a wide range of external threats to minimize the risk of having the information destroyed

After looking at the extensive list of requirements, the National Museum approached the market to help us solve these challenges. Already having establish a partnership with the National Library of Norway for a "bit bank" to maintain our files, we were now looking for something even more robust and long-term, that could withstand any type of threat to our data for the decades to come. The National Museum have a national responsibility and seeing other tragic incidents, such as with the fire in the National Museum of Brazil in recent times, we could not afford to take any risks.

After some solid ground work, the institution focused on the local Norwegian company Piql, a heavily R&D-funded and European Union supported company which has, over several years developed a specifically designed technology to solve the challenges of digital preservation with a true long-term perspective.

Piql, by combining a proven storage medium using robust black and white film with a proven longevity and track record of more than 150 years, hash uniquely designed capabilities that can preserve any kind of digital file. The National Museum saw it could also meet most of its requirements from the initial requirement list for preservation. Further, the opportunity to document information about the files, the file format specifications, as well as how to retrieve this information both using a machine reading process or even and manual, human process on the storage medium, made the technology stand out. It, therefore, provides as the ultimate insurance that the digital assets would be protected and fulfills the stringent requirements of the museum.

Piql's technology has been developed through a collaboration with research and technology partners across the world to create an open and holistic approach to the complex problem landscape of digital preservation and is supported to handle any kind of digital file with a strong documentation of the file format and how to read back the file in the future.

Further, when Piql shared its ambition to offer a truly unique and secure physical location to preserve cultural heritage data for centuries in a neutral geographical location in Norway, the parties saw a great potential for a fruitful and long-term partnership and the parties started collaboration.

Arctic World Archive

In 2017 Piql initiated the establishment of the Arctic World Archive on the arctic island of Svalbard, Norway. Together with the state-owned mining company, Store Norske, the parties wanted to follow the highly successful initiative of the Global Seed Vault and create a data vault for protecting some of the most important and irreplaceable data in the world by placing it into a former arctic mine of Svalbard. The location is geographically secluded and protected by a treaty denying any kind of military activity. With very stable conditions in terms of natural disasters as well as ideal conditions in terms of darkness, temperature and humidity for storing the Piql technology, the Vault would serve as the ultimate place to store digital copies of some of the world's most valuable content and knowledge about the cultural history of the world.

Following the first deposit of data from the inaugurating institutions in 2017, the National Museum decided to safeguard some of their most valuable digital assets in the second deposits taking place in Arctic World Archive in February 2018. The complete collection of Edvard Munch's works was securely placed in the Vault, making sure the knowledge about the paintings, how the conditions of the paintings were around in the 2000s would be accessible for future generations, even decades and even centuries ahead. Other institutions to have deposited some of their most valuable collections during the inaugurate events were the National Archives of Mexico and Brazil, as well as the Vatican Library.

Following the deposit in 2018, the National Museum did their 2nd deposit during the 3rd deposit in February 2019, joining more than 20 international institutions to safeguard some of their most valuable assets in the vault up in the Arctic. This time the museum had picked a combination of works from different departments and artists, including a wide range of different files formats, such as pictures (Tiff), videos (Mpeg-4), documents (PDF/A) and even 3D objects. The deposit showed the great depth of the collections of the National Museum as well as complexity of art pieces the institution is responsible of preserving.

The Arctic World Archive aims to not only preserve some of the most important digital collections from the cultural domain of art, books, archives and others, but also to showcase the content for a global audience. In this way, it emphasizes the value of taking care of our past and make it accessible for our future generations, regardless of it being in 50 years or 200 years.

The mission of the Arctic World Archive is to create a data bank, in the similar way the Global Seed Vault is for the protection of the global seeds existence, to be able to secure the digital memory of the past and the presence for the future generations. The need for having opportunity to access authentic, reliable versions of digital content in a fast-changing world with both societal, environmental and technological movements gives this initiative a very strong mandate. Preserving world memory. The purpose is to have the data stored governed by an independent and non-for-profit foundation, making sure the data always will be accessible for the rightful owners of the digital information. Together, Piql and the National Museum are making sure a little piece of the cultural heritage is preserved. Forever.

Partnership

The National Museum and Piql are continuing to collaborate on several projects, including the development of a virtual machine. The «Immortal Virtual Machine (IVM)» - project, funded by the Norwegian Research Council aims to make a self-documenting virtual machine. The virtual machine aims to simplify the process on how institutions in the future can extract preserved information from a storage medium and give back the original file, independent of the technological obsolescence.

We believe that the collaboration between our two organizations can be a testimony of an example on how the providers of problem-solving technology can work together with institutions to offer an initiative that meetings the industry's needs. It can also help to raise awareness of the challenges and risks, inviting attention from other parties, such as financiers interested in safeguarding and showcasing cultural heritage.

The presentation will focus on how the two parties towards a successful in the project and how and why a national institution such as a National Museum should take part in such an initiative as the Arctic World Archive project.

Author Biography

Bendik Bryde, business development manager, Piql. Mr. Bryde has worked together with several global partners, including the National Museum of Norway, on a wide range of digital archiving and long-term preservation projects. He has previously presented on several European archival conferences addressing the issues of long-term digital preservation.

Jahn-Fredrik Sjøvik, former CIO of the National Museum and currently Consultant Manager with one of ten largest information technology consulting houses in Europe, Sopra Steria. Sjøvik will be presenting on behalf of the National Museum as he was formerly involved and responsible in the establishment of the project and to simplify language barriers. After leaving his former position as CIO of the National Museum, Sjøvik took a place on the board of Piql to further support the development of the technology and the initiative behind Arctic World Archive. Sjøvik is a visionary and creative technology leader with 15+ years of experience in Sales, Project Management, Business Consulting and Digitization.*

Morten Thorkildsen, Head of Photography, National Museum of Norway. Morten is the Project Owner of the collaboration. Thorkildsen has been with the National Museum, previously as part of the National Museum of Contemporary art since 1990 as a photographer and head of the photo department. He is a long-time recognized leader and now board member of the association of institutional photographers of Norway (IFF).