

Digitization and Preservation of Cultural Heritage Information – A Nordic focus

CHRISTIAN-EMIL SMITH ORE

DEUTSCHSPRACHIGE ZUSAMMENFASSUNG

Digitalisierung und Konservierung von Informationen zum kulturellen Erbe – Ein nordischer Fokus

Der Beitrag bietet einen Überblick über den bisherigen Fortschritt bei der Digitalisierung des kulturellen Erbes sowie über den Status der digitalen Informationsbestände zum kulturellen Erbe in den drei nordischen Ländern Dänemark, Norwegen und Schweden. Dabei liegen kulturhistorische Museen, archäologische Stätten und Baudenkmäler im Zentrum des Fokus.

Das materielle Kulturerbe sowie das Wissen über dieses Erbe werden zur Zeit sowohl von absichtlicher Zerstörung als auch von Vernachlässigung, vor allem aber vom ständigen Entwicklungsdruck in Städten und ländlichen Gebieten bedroht. Deswegen ist es wichtig, bereits jetzt so viel Dokumentationsarbeit wie möglich durchzuführen und möglichst dafür zu sorgen, dass den Stätten, Baudenkmalen und Befunden ein ausreichender Rechtsschutz gewährt wird. Dänemark und Schweden weisen eine Tradition des Rechtsschutzes für kulturelles Erbe auf, die bis ins 17. Jahrhundert zurückreicht. In Norwegen hingegen wurde erst 1905 das früheste Gesetz zum Schutz des materiellen Kulturerbes vom Parlament verabschiedet. Die aktuelle Gesetzgebung ist in allen drei Ländern sehr ähnlich.

In Dänemark und Schweden ist der Staatssektor zentralisierter als dieses in Norwegen der Fall ist. Das Informationssystem zur Verwaltung des Kulturerbes in Dänemark zeigt das größte Maß an Zentralisierung auf. Das dänische SARA-System könnte als Vorbild für Norwegen und Schweden dienen, allerdings dürfte es nicht in der Lage sein, das Problem des ‘Verschwindens’ von Informationen in modernen administrativen Archivierungssystemen zu lösen. Dies ist ein kompliziertes Problem, das grundsätzliche Änderungen im Archivierungsverfahren erfordert. Paradoxe Weise erfordert die zunehmende Dezentralisierung der Erbeverwaltung

das Eingreifen ‘irgend’ einer zentralen Behörde, die die Informationssysteme harmonisieren kann. Wenn das Ziel einer sinnvollen Integration von digitalen Daten erreicht werden soll, muss die Verlinkbarkeit von Daten mittels des ‘semantischen Klebstoffs’ gemeinsamer Ontologien gewährleistet werden. Digitale Daten gehen leicht verloren, dieses zeigen bisherige Erfahrungen mit der digitalen Ausgrabung deutlich. Das allgemeine Problem, Daten verlinkbar zu machen, besteht nicht nur innerhalb von Institutionen, sondern auch zwischen ihnen und trifft auch den Austausch auf dem nationalen Niveau Skandinaviens.

Die Geschichte dieser Länder stellt einen weiteren Faktor dar. Die Narrative der Nationsbildung in Norwegen basiert zum Teil auf dem Verständnis der Zwangsunion dieses Landes mit Dänemark als einem dunklen Kapitel in der Vergangenheit, welches 400 Jahre dauerte. Für Norwegen (wie auch für Island) ist die Wiedererlangung mittelalterlicher Handschriften und anderen historischen Objekten von Dänemark und Schweden ein wichtiger Aspekt der (Wieder-)herstellung der modernen Nation. Dem Ende des Preußisch-Dänischen Krieges 1864 folgte eine kurze Periode eines aktiven und ausgeprägten Skandinavismus, allerdings konnte die Bewegung sich nicht langfristig durchsetzen. Diese Faktoren könnten der Grund dafür sein, dass es leider keine gemeinsamen Webseiten oder verlinkten Datenbanken für das eng verwobene Kulturerbe der nordischen Länder gibt. Das Potenzial ist unbeschadet dessen groß.

SUMMARY

The paper gives an overview of the digitization of cultural heritage and the current status of digital cultural heritage information in the three Nordic countries of Denmark, Norway and Sweden. Cultural heritage is a very broad term which includes libraries and archives. The main focus is on cultural history museums and archaeological sites and monuments.

Physical cultural heritage and the available knowledge about it is under threat from deliberate destruction and general neglect, but above all from the pressure of constant development of lands and cities. Thus it is important to do proper documentation while this is still possible and to ensure that sites, monuments and finds have sufficient legal protection. In Denmark and Sweden, cultural heritage legislation has a tradition going back to the 17th century. In Norway the first law protecting tangible cultural heritage was passed by parliament in 1905. The current legislation is quite similar in all three countries.

Denmark and Sweden have a more centralized public sector than does Norway. Denmark has the most centralized information system for dealing with cultural heritage. Its new SARA system could serve as a model for Norway and Sweden, but SARA may not solve the problem of cultural heritage information ‘disappearing’ in modern administrative archival systems. This is a complex problem that calls for changes in archival procedures. Paradoxically, the increasing decentralization of the administration of cultural heritage requires that information systems be harmonized by some central authority. To achieve a meaningful integration of digital data, it is necessary to make the data linkable by using common ontologies as “semantic glue”. Digital data can easily be lost, as the history of digital excavation demonstrates. There is a general problem of

making data linkable both within institutions and between institutions, as well as across the countries of Scandinavia.

The history of those countries is a factor. Norway’s narrative of nation-building was in part founded on the conception of its union with Denmark as a dark period lasting 400 years. For Norway (as for Iceland), it has been important to recover medieval manuscripts and other historical objects from Denmark and Sweden as a part of the (re)building of the modern nation. After the Prussian-Danish war of 1864 there was a short period of active Scandinavism, but it did not really take hold. These factors may be the reason why there are, unfortunately, no common websites or linked databases for the intertwined cultural heritage of the Nordic countries. The potential, however, is great.

Introduction

The main focus of the conference “Das Digitale und die Denkmalpflege” was the increasing digitization in all domains of cultural heritage preservation work and the question how this is changing our handling and our understanding of monuments. I was asked to give an overview of developments in Scandinavia and present the Scandinavian perspective. Thus I have concentrated on the three Nordic countries of Denmark, Norway and Sweden, and have left out Finland and Iceland. Cultural heritage is a very broad term which includes libraries and



Fig. 1: Stedje stave church in 1862, 5 years before it was demolished, drawing by Hermann Schirmer

archives; however, the main focus in this paper will be cultural history museums and archaeological sites and monuments. I have worked with digitization and information systems for cultural heritage documentation in Norway since 1990 and I am most familiar with the Norwegian situation. As far as possible I have tried to give equal attention to all three countries.

Cultural heritage and cultural information

The German term ‘Denkmal’ corresponds to the Norwegian term ‘minnesmerke’ (memorial), or ‘fortidsminnesmerke/fornminne’ when used to denote Medieval structures or prehistoric sites and monuments. The term ‘fortidsminne/fornminne’ can also refer to finds and artefacts. There are slightly different spellings of these terms in the three Scandinavian languages. Today the term ‘kulturminne’ (literally ‘cultural memorial’) is used in legislation on sites, monuments and museum objects – that is, on most of what constitutes ‘tangible cultural heritage’ in the definition of cultural heritage given by UNESCO¹:

Tangible cultural heritage:

- 1) movable cultural heritage (paintings, sculptures, coins, manuscripts);
- 2) immovable cultural heritage (monuments, archaeological sites, and so on);
- 3) underwater cultural heritage (shipwrecks, underwater ruins and cities);
- 4) Intangible cultural heritage: oral traditions, performing arts, rituals.

It should be noted that UNESCO’s definition of cultural heritage is operational in nature and says nothing about the cultural value of the heritage. To this extent it differs from the term as it was used in the 19th and in the early 20th centuries, when ‘cultural heritage’ in many cases denoted that which was worthy of being preserved. On Wikipedia we still find a value-oriented definition of cultural heritage: “Cultural heritage is the legacy of physical science artifacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.”²

Unfortunately, tangible cultural heritage in the sense defined by UNESCO is often neglected, selectively maintained or actively destroyed, and is therefore not handed on to future generations. One reason for this can be a clear will to destroy evidence of past cultures that does not fit the ideology of the

current power in an area. Examples of this are legion in the history of human civilization. A common and more prosaic reason for the destruction of (tangible) cultural heritage is ignorance or a not unreasonable wish to get rid of the old in order to develop new and efficient agriculture, cities and other infrastructures. This is a process that has been accelerating for 200 years and cannot be stopped. This fact makes it even more important to document existing sites and monuments, to preserve finds and other artefacts, and to secure both old and new documentation and disseminate this information to the public. For it is not only tangible heritage that is at risk: there are recent examples of the intentional and pointed destruction of cultural-historical documentation, for example the bombing of the National Library in Sarajevo 25 years ago. If it is not possible to protect the physical sites and monuments, we need to generate and protect information about them before they are destroyed. Digitization may be a help if the digital information is distributed and kept in many separate places in the world.

Early cultural heritage preservation in Denmark, Norway and Sweden

Seen from abroad, the Scandinavian countries of Denmark, Norway and Sweden are often considered to be a peaceful, homogeneous outlier of Europe. The three countries have a very entangled history, closely related cultures and mutually understandable languages. A closer look at their history will reveal, however, a typical European history involving rivalry and armed conflict. Denmark and Sweden were competing great European powers in the 17th and 18th centuries, and fought each other until the end of the Napoleonic Wars.

Beginning in the late 16th century, the curiosity cabinets or ‘Kunstkammer’ became popular, both as study collections for wealthy scholars and as showcases in which nobles and kings could display their power, wealth and cultural importance. In Denmark, an early example is the famous curiosity cabinet established in the early 17th century by the learned and wealthy man Ole Worms (1588-1654). In both Denmark and Sweden, royal collections were established in the first half of the 17th century.

As early as 1630 the Swedish king appointed Johannes Bureus to the post of “National Antiquarian” (Riksantikvarie)³. Bureus was a distinguished scholar of runic inscriptions. In 1666 one of his successors, Johan Hadorph, wrote the first royal decree for

the protection of sites and monuments. The office of the National Antiquarian gradually developed into the current Swedish National Heritage Board (Riksantikvarieämbetet). In the 17th century the Riksantikvarie became the secretary of the Royal Swedish Academy of Letters, History and Antiquities (Kungl. Vitterhets Historie och Antikvitets Akademien)⁴. In the mid-19th century the Riksantikvarie established the National Historical Museum (Statens historiska Museum)⁵, with responsibility for archaeological finds and church furnishings – a task still carried out by its successor institution, the National Historical Museums. The close ties of the heritage authorities to the Royal Swedish Academy and the National Historical Museums have been loosened over the past 50 years. The Swedish National Heritage Board has gradually been transformed into a purely governmental administrative body. Archaeological excavation activity has been transferred to the National Historical Museums.

In 1650 the Royal Danish Kunstskammer⁶ was established. The Wormeian collection became a part of this royal collection after the death of Ole Worms in 1654. The institution existed until 1825, when the collections were split up and given to more specialized museums. One part of the collection became the current National Museum (Nationalmuseet)⁷; its director had until 2002 a function similar to the Swedish Riksantikvarie. Like its Swedish counterpart, the Danish National Museum also had national responsibility for regional museums and archaeological finds, as well as for the collections of information about them. This cultural heritage administration was gradually reorganized from 1986 to 2002, when the Cultural Heritage Agency (Kulturarvstyrelsen) was established, which later (2016) became a part of the Agency for Palaces and Culture (Slots og Kulturstyrelsen)⁸. The latter has an overarching responsibility for palaces, sites and monuments, museums, protected buildings, art, and libraries.

Norway has a quite different history. In 1397 the Kalmar Union consisting of Denmark, Norway and Sweden was established, but was finally broken by Sweden in 1522. Norway became a de facto part of Denmark from the Lutheran reformation in 1537 until the signing of the Kiel Peace Treaty between Denmark and Sweden in 1814. The original intention of the treaty was to hand the territory of Norway over to Sweden. For unknown reasons, however, the Swedish crown prince and former French

general Jean-Baptiste Bernadotte intervened and insisted that Norway should be considered a separate kingdom in a personal union with Sweden under his leadership. Somewhat surprisingly, the very liberal Norwegian constitution stemming from the short period of Norwegian independence in 1814 was accepted by Bernadotte.

In 1814 Norway was a very poor country with no royal collections and with no aristocracy to pursue an interest in collecting. The merchants and the independent farmers were strong, and there was clear opposition to the notion of a powerful capital with central cultural institutions.

To the extent that antiquities in Norway were taken care of by the government before 1814, they were sent to the capital, Copenhagen. There were a few small private collections and in addition the limited collections of the Royal Norwegian Society of Sciences and Letters, which had been established in Trondheim in 1760. Protection for sites, monuments and finds was not mentioned in Norwegian legislation until 1905. Norway has never had a central museum such as those in Sweden and Denmark. In Norway there are five museums responsible for excavations and finds: those established in Trondheim in 1775 (connected to the Royal Norwegian Society), in Oslo in 1811/1829 (as part of the new university), in Bergen in 1825, in Tromsø in 1872, and in Stavanger in 1877. The museums of Bergen, Trondheim and Tromsø formed the nucleus of the universities founded in the 20th century. At the end of the 19th century, the five museums became responsible for archaeological surveys and excavations in their respective parts of Norway. In addition there are two maritime museums in Oslo and Bergen, which are responsible for marine archaeology in their regions.

From its establishment in 1844 until 1909, the Society for the Preservation of Ancient Norwegian Monuments (Fortidsminneforeningen)⁹ was the de facto cultural heritage authority and collaborated with the museums. In 1909 its responsibilities were taken over by a governmental Cultural Heritage Authority (Riksantikvaren)¹⁰, which developed into the current Directorate for Cultural Heritage with functions similar to those of the Swedish National Cultural Heritage Board.

Cultural heritage legislation

In Norway the first law mentioning cultural heritage was the “law concerning churches and grave-

yards” of 1887, passed at a time when 80 percent of the country’s medieval stave churches had already been demolished. There was no legal protection for finds, sites and monuments until 1905. Until then, landowners held legal rights to all archaeological finds on their property. In 1904 the discovery of a well-preserved 9th-century Viking ship in a grave mound on the Oseberg farm triggered action. To protect future finds, a law providing for the protection of physical cultural heritage was passed by Norway’s parliament in 1905. Fortunately, the owner of the Oseberg mound accepted financial ‘compensation’, and the ownership of the Oseberg finds was transferred to the University of Oslo.

In Denmark and Sweden, with their long tradition as centralized kingdoms, the protection of sites and monuments and the crown’s ownership of stray finds have been regulated by legislation since the 17th century. The degree to which these rules were followed in the past, however, is another question. The cultural heritage legislation in the two countries was further developed throughout the 19th century, with the establishment of central museums with explicit responsibility for material cultural heritage. Today the legal protection of material cultural heritage in all three Scandinavian countries is quite homogeneous, though with some interesting differences in their respective legislation. In all three countries the laws contain quite similar lists of the types of sites and monuments that are considered to be cultural heritage and that can therefore be protected.

In Denmark the law¹¹ requires that structures be visible, and the list of sites and monuments is divided into those automatically protected and those not protected unless the landowner is informed. Buildings built before 1536 are automatically protected, whereas no year is specified for the other category.

In Swedish law¹² all items on the list, including shipwrecks dating before 1850, can be protected by the government and the counties (län) without further ado. Churches and graveyards dating before 1939 are protected.

In Norway, all items on the list that were created before 1537 comprising almost all traces of human activity as well as standing buildings constructed before 1649 are automatically protected by law¹³. The legislation includes two additional paragraphs: all Sami sites older than 100 years are protected, and in the northernmost part of Norway, all buildings and structures dating prior to 1945 are protect-

ed. The first paragraph is an acknowledgment of the importance of Sami culture and an expression of respect after years of forced assimilation to the dominant Norwegian culture. The second paragraph is a response to the almost total destruction wreaked by the retreating German forces in the fall of 1944. These are examples of how external circumstances influence what it is considered important to protect. In all three countries, buildings and other structures considered to be of cultural importance can be protected by an explicit declaration.

Current access to digital cultural heritage information

Until 2002 the Danish National Museum had special responsibility for the museums of archaeology and general cultural history. Even today the National Museum is named in Denmark’s cultural heritage legislation as one of the country’s three main museums (of cultural history, art, and natural history). According to this law, all state museums and museums receiving state funding are obliged to send particular information about objects, excavations, find locations, etc. to the Palace and Culture Agency. This information is accumulated in three registers: museum objects, archaeological sites and finds, and objects of fine art. This centralized organization makes it easy to publish up-to-date information (including photos) about the museums’ collections, art, sites and monuments, and protected buildings. A drawback for the general public is that the museum object registry is designed as a summary for museum professionals. Thus the information is sparse and the records are not linked directly to richer digital sources such as museum management systems, libraries, or historical or local archives. This may change in the near future.

Since the end of the 1990s, Denmark’s Palace and Culture Agency and its forerunners have developed and maintained a central database system called REGIN¹⁴, which can be used free of charge by all of the state-funded museums. Since 2008, a new system has been in development: the SAMlingsRegistrering og Administration (Collection registration and administration) system or SARA¹⁵ will be launched in 2017. It is based on the commercial document management system ADLIB. SARA is designed to contain object information, documents and digital assets for all of the state-funded museums, as well as to deliver data to the central registries and to Europeana. The data model is CIDOC-CRM¹⁶

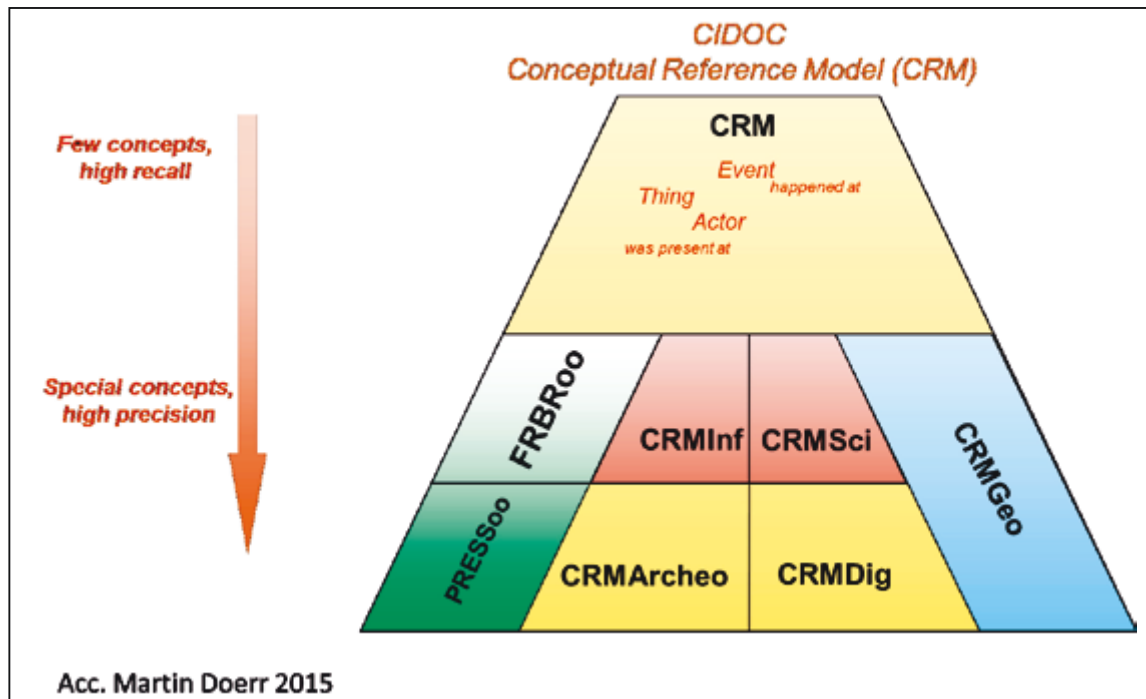


Fig. 2: The CIDOC-CRM extension suite, the family of ontologies (20/02/2017)

compliant and follows the SPECTRUM recommendations for workflows and processes in museums. It will certainly be interesting to follow and read about the experiences of such a unified museum system for the entire Danish museum community.

In Sweden there are 10 museums or groups of museums organized as agencies under the Ministry of Culture. Each agency consists of at least one larger, well-established museum and has specific responsibilities. The aforementioned National History Museum is the senior partner in the agency called National History Museums, which holds responsibility for (older) cultural heritage and archaeology. It administers a large unit for contract archaeology.

The Swedish National Heritage Board itself is a governmental administrative agency under the Ministry of Culture, with overarching responsibility for tangible culture. The Swedish National Heritage Board is responsible for the site and monument registry and the registry of protected buildings. The content of these registries is updated by the 21 counties (län), which are responsible for archaeological surveys and excavations. The public has access to these official registries.

The Swedish National Heritage Board also runs a common search index, K-samsök¹⁷, with a web interface known as Kringla¹⁸. K-samsök indexes a large number of the collection databases in Swedish museums. It is an aggregator for Europeana. Participation in K-samsök is based on will and technical

ability. Several large museums are currently not members. There is an alternative web portal, called Digitalt Museum¹⁹, which gives access to a large number of Swedish museums using the Norwegian collection management system Primus²⁰. In Sweden there are at least three different collection management systems used by the museums.

The administration of the cultural heritage institutions in Norway is somewhat less rational than that in Denmark and Sweden. As in the latter two countries, the museums for general cultural history and fine arts, the national library, and the national archives are administered by the Ministry of Culture through the Arts Council of Norway. The five university museums, being parts of the universities, are assigned to the Ministry of Education. The Directorate for Cultural Heritage is under the Ministry of Climate and the Environment. The number of ministries involved is unfortunate since it makes the coordination of overarching measures difficult. Today there is one portal, Digital Museum²¹, for the museums under the Ministry of Culture, and another, UNIMUS²², for the five university museums. There is also a general portal, Norvegiana²³, which gives access to the data from almost all Norwegian museums independent of the collection management system. Norvegiana is the main museum aggregation point to Europeana.

Most museums in Norway use the aforementioned PRIMUS collection management system. The

National Museum for Arts, Design and Architecture and a few other museums have bought standard commercial systems such as MuseumPlus. The university museums have developed their own content management system.

Norway's national registry of protected buildings, sites and monuments is maintained by the Directorate for Cultural Heritage and is updated by that agency as well as by the 19 counties and seven museums responsible for archaeology. As in Sweden, the public has access to the data in this official registry through a special portal²⁴ which hides some of the data. The data in these registers are also used by the county administrations in the everyday work of land development and building proposals, and can only be updated by specially authorized persons.

Digitization and the digital

'Digitization' and the 'digital' have been buzz words for many years. It is not always easy to understand what is meant by 'digitization' when the term is used by politicians and the managerial levels of organizations; indeed, there is reason to believe that they do not always know what they mean by it either. In my view, 'digitization' typically denotes:

- the conversion of existing information recorded on paper and physical media to a digital format
- the exclusive production of new information in a digital format
- the use of digital channels (emails, web pages etc.) for internal and external communication
- the basing of administrative procedure on computerized document and archival systems.

Up until now, 'digitization' in the cultural heritage sector has largely involved retro-digitization of older document collections and archives. In the last 10 years, almost all new information has been 'born' digital, and the amount of information has increased dramatically. It is also evident that most information is now exchanged via digital media channels. Most large organizations and governmental bodies have started to use computer-based document and archival systems. The management and documentation of cultural heritage are to a large extent digitized in the three Nordic countries. However, digitization in the four dimensions described above may not be enough, and may also cause loss of important information if not done with care. There are at least three groups of typical challenges and problems:

- 1) the storage of information in closed 'data silos';
- 2) the actual loss of digitally-born data; and
- 3) the 'disappearance' of cultural heritage data in standard administrative systems.

Closed data silos and contextual information

The Norwegian Digital Museum and Sweden's Kringla/K-samsök have modern interfaces, use linked data where appropriate, and use information taken from the museums' content management systems. The result pages appear informative; however, a closer inspection reveals that most of the texts on the page are headings and general messages such as "There are no related objects" or "There are no photos in Wikimedia Commons". For what may be a majority of the entries, the information is very sparse.

It is a well-known problem that information about the objects in museum management systems is meagre. In museums, archives and libraries, the physical objects are at the centre of attention, hence most of the information in the systems is organized as attributes describing the artefacts as physical objects. The more interesting description of the historical and cultural context of the objects is found in exhibition catalogues, reports and academic publications. These texts were not available in digital format until recently. Today they are usually available in digital form, but the digital texts rarely include 'live' links to the records for the artefacts or sites referred to. On the other hand, the content management systems commonly store bibliographical references, but these rarely refer to digital publications or are formatted such that they can easily be converted to a digital link.

This is both a little surprising and somewhat disappointing when one considers that the idea of hypertext was introduced over 30 years ago, the web 25 years ago and linked data at least 10 years ago. For a decade we have been told to avoid information islands and the slogan has been "Open the data silos". According to my own experiences, there is a real wish to make cultural heritage data linkable. However, the Semantic Web, Linked Data and RDF-technology²⁵ may have been oversold as systems in which everyone is able to say anything about everything. The underlying idea often seems to be:

- increased volume of data = increase in amount of information
- increased interlinking = increase in information
- popular view: everything is connected to everything.

This is of course not true and may be called “the principle of entropy fallacy”. Information is generated from data through exclusion using meaningful distinctions according to a common conceptual model or formal ontology. Data organized according to such ontologies and the ontologies themselves can be expressed as RDF triples. Consequentially, Linked Data can function as a medium for generating meaningful statements about data. In other words, to create more than a trivial use of linked data in a domain, the linking has to be in compliance with a well-defined ontology for the domain in question.

The best use of ontologies and linked data in the Nordic countries is actually found in Finland. There, a series of LOD projects for Finnish history and culture have been published, called ‘sampos’ (after the Finnish mythological object sampo). The team behind many of these, led by Eero Hyvönen at the Aalto University, argues that the well-known 5-star model for Linked Open Data (Berners-Lee 2006)²⁶ should be extended to a 7-star model. The sixth star requires that the schemas (RDFS) used in a LOD dataset be explicitly described and published together with the dataset, if they are not publicly accessible on the web. The seventh star requires that the “quality of the dataset against the given schemas used in it [be] explicated so that the user can evaluate whether the data quality matches her needs”.²⁷ The most recent of these sampos, called the WarSampo, concerns Finland in the Second World War and links a large number of datasets. In WarSampo, CIDOC-CRM is used as the harmonizing basis for modelling data, with events providing the semantic glue for data linking.²⁸ This is an elegant example of an advanced LOD application scalable through the use of a common conceptual model designed for data integration. According to Hyvönen, the Finnish WarSampo can be extended to larger parts of the history of the Second World War by mapping the content of archives and collections to the common conceptual model.

Some distance yet separates the Finnish WarSampo from cultural history museums and sites and monument records. Still, the design of WarSampo illustrates what can be achieved through the use of common authority systems and a common conceptual model. That is, it is necessary to understand the structure of our data through an ontological analysis, and then to establish a consistent and well-founded data model or ontology.²⁹ The term Linked Data is in fact misleading. What we really

do is make our data linkable, thus the term used should be Linkable Data.

Loss of digitally-born data

In 2015 the Swedish National Heritage Board did a survey of the state of the data from contract excavators, both private companies and regional museums.³⁰ The results of the survey are not encouraging. The data are stored in many different formats on PCs and servers using different operating systems and platforms. Only the reports, mostly printed on paper, are sent to the Swedish National Heritage Board. The contractors report that they do not have the resources to convert, systematize and transfer the data. On the positive side, the survey gives a detailed and more or less complete picture, and the data are recoverable given sufficient resources. In 2014 the Swedish National Heritage Board established a five-year programme, the Digital arkeologisk process (Digital Archaeological Process)³¹, which will run until 2018 and which has as one of its objectives the securing of digital excavation and survey data. Unfortunately, it is quite probable that a large amount of the digital data from 1990 to 2014 has been lost.

In Norway, archaeological excavations are done by 7 museums, 19 counties and one semi-private foundation. During the last 10 years, the Swedish GIS-based system INTRASIS³² has become the de facto standard for documenting excavations. Still, the backlog of digital excavation data from 1990 and later is a problem in Norway. There is no common repository for archaeological datasets, archival practices vary, and the state of preservation of datasets from 1990 to at least 2005 is unclear. Fortunately, in May 2017 the Norwegian Research Council agreed to fund a large infrastructure project with the objective of securing the existing digital excavation data and building an infrastructure to care for data from future excavations.

In Denmark, excavations and surveys are done by local state-funded museums. Most museums use the Danish documentation system Museernes Udgravningsdata (The Museums’ Excavation Data) or MUD which has been developed over the last 20 years, and a few use the Swedish INTRASIS system. Responsibility for the care of the data lies with the museums. The new SARA system contains a repository for such datasets. The actual state of preservation of data sets from surveys and excavations is currently unknown.

The EU infrastructure project for archaeological data known as ARIADNE (2013–2016)³³ assessed the preservation of excavation data in Ireland and Slovenia.³⁴ From Slovenia it is reported that “all digital data from excavations prior to 2013 has been left completely in the hands of the researchers, being either public or private legal bodies.” The only open sources are the obligatory short written excavation reports. In Europe there are two very good examples of institutions caring for digital archaeological data: DANS in the Netherlands and ADS in UK. In recent years other initiatives have been established, for example the German IANUS³⁵, the US-based tDAR³⁶ and Open Context³⁷, and others. Unfortunately, many countries do not have such services even today.

Historical archives and new archival systems

Cultural heritage institutions usually have old archives and document collections that contain valuable information. For example, the Norwegian university museums have topographically ordered archives containing complete and detailed information about sites, monuments, archaeological surveys, finds and instances of destruction for the full period from the museums' establishment in the early 19th century to 1990. In 1990, responsibility for the administration of sites and monuments was delegated to the 19 counties. Today the information on sites and monuments is kept in at least 26 different administrative archival systems which also contain information about all kinds of everyday administrative issues. It is difficult to extract all of the information about a given site, survey or protected building, since the object identifier from the site and monument registry is not necessarily used as one of the archival keys. One conclusion that can be drawn from this situation is that decentralization of responsibility requires centralization of information

maintenance. The specific obligatory rules for local and governmental archives make this a complicated task. The situation in Norway is in many ways comparable to that observed in Sweden: cultural heritage information is kept but ‘lost’ in a sea of general administrative information. This problem is rarely discussed in the literature. Still, I believe it to be one that exists in many countries.

Conclusions

The documentation and administration of tangible cultural heritage does not differ substantially across Denmark, Norway and Sweden, but the legislation in each country is different in its details. Denmark has the most centralized system for dealing with cultural heritage. Its SARA system could serve as a model for Norway and Sweden, but SARA may not solve the problem of cultural heritage information ‘disappearing’ in modern administrative archival systems. This is a complex problem that calls for changes in archival procedures.

I have pointed to the general problem of making data linkable within institutions and between institutions, and the problem is no less serious on a Scandinavian level. Here the history of the countries is a factor. Norway's narrative of nation-building was in part founded on the conception of its union with Denmark as a dark period lasting 400 years. For Norway (as for Iceland), it has been important to recover medieval manuscripts and other historical objects from Denmark and Sweden as a part of the (re)building of the modern nation. After the Prussian-Danish war of 1864 there was a short period of active Scandinavianism, but it did not really take hold. These factors may be the reason why there are, unfortunately, no common websites or linked databases for the tangled cultural heritage of the Nordic countries. The potential, however, is great.

List of illustrations

- 1 Frode Larsen, National Museum of Arts, Design and Architecture (CC-BY-NC, <https://creativecommons.org/licenses/by-nc/4.0/deed.no>)
- 2 Martin Doerr

Annotations

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