

The National Library at a Crossroads: the Digital Content Revolution and its Consequences

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ABSTRACT

This article identifies a number of challenges facing national libraries all over the world as digitally-born materials replace the physical antecedents that have been well known to us for centuries, and it describes how the Royal Library of Denmark is responding to these challenges. The author argues that if we want to preserve the digitally-born part of cultural heritage and knowledge production in the future, these problems have to be solved. We are running out of time if we are to avoid the loss of data and cultural heritage in the coming decades, as indeed happened on the web in the 1990s.

Libraries all over the world are encountering new challenges as a result of the quite astonishing changes that have taken place during the last generation as a consequence of the electronic or digital¹ revolution. In fact, one could reasonably claim that more has changed in the past thirty years than in almost the last one thousand years since the founding of the first monastic libraries in Europe.

In most libraries at least six major 'digital revolutions' have taken place in a period of less than twenty years: in access, lending, content, networks, retrodigitization and search systems, all contingent on and facilitated by access to the internet in 1991 and the emergence of the web a few years later (for further information see Nielsen et al., 2005). These revolutionary developments have affected all research libraries, special, university or national libraries. But national libraries have faced, and will continue to face, their own particular challenges. These arise from the fundamental changes to all the types of materials traditionally collected, preserved and made available by European national libraries, ever since their foundation mainly as royal or university libraries in the sixteenth and seventeenth centuries.

A recent difference between university and national libraries derives from developments in the digital world, where materials, including digitally-born materials, are made available to the public via libraries. While the emergence of tools and search systems is common to all, even though, unlike the

¹ The term 'digital' has replaced the term 'electronic' over the past decade, as the content of libraries has gradually become digital, either via born digital production or through retrodigitization. In this context 'digital' is being used as an inclusive term.

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previous 'analogue' world, these are increasingly being developed outside the sector, national libraries must also create and collect digital content in the digital world. This is not being duplicated in university libraries to the same extent as in the previous physical world, since for the most part the commercial sector produces IT resources for university libraries' study-relevant, although not always research-relevant, needs. By collecting manuscripts and personal archives in the physical world, many university libraries also covered aspects of the tasks of national libraries and archives, but these are unlikely to be transferred to the digital world, except possibly with a few exceptions in the Anglo-Saxon world. In the future, the acquisitions of university libraries will be largely streamlined to what can be purchased or given digital access to in other ways, while their own production and archiving and storage will either disappear altogether or be considerably reduced by comparison with the previous situation in the physical world.

National libraries all over the world find themselves at a crossroads in the present decade. Digital developments are creating completely different strategic and management challenges to those of just a few decades ago. The speed of these developments has been very rapid in recent years, not least because of progress nationally and internationally. As a result, new strategies are required, as well as changed priorities and different foci: this does not, however, necessarily bring about fundamental changes in the mission or tasks of national libraries.

These changes are reflected in the remits of national libraries in legislation, funding and in other contexts. In Denmark the responsibility of the Royal Library is now set out in the latest official 'Framework Agreement' between the Royal Library and its responsible Ministry, the Ministry of Culture. It reads as follows: 'As national library² the institution administers the national cultural heritage of both Danish and foreign origin in the form of published works (books, periodicals, newspapers, pamphlets), manuscripts, records, maps, pictures, photographs and music in analogue or digital form, including the Danish part of the internet in Net Archive, and documents the immaterial culture of everyday life....'

As has also been the case with annotations to the Finance Act³ over

² Since 1927 The Royal Library in Denmark has had a dual function as Denmark's national library and as the university library for Copenhagen University; the latter was extended via extensive mergers with the University Library's UB1 Department in 1990; and the Danish National Library for Science and Medicine (previously the University Library's UB2 Department) in 2005; and a cooperation agreement with the University in Copenhagen University's Library and Information Service 2007, made permanent in 2012, which also includes the remaining faculty and institute libraries as well as the university libraries, which via the university mergers in Denmark in 2007 were incorporated into Copenhagen University.

³ In the absence of an Act setting out The Royal Library's duties, the description given in the annotations to the Finance Act constitutes the most authoritative remit for the institution.

the past few years, digital cultural heritage is now specifically mentioned. Broadly speaking, this falls into three main categories: (1) retrodigitized analogue material; (2) digitally published materials on national domains on the internet; and (3) digitally produced material in the same categories as in the former physical world, along with some new ones, but to a degree and with a diversity of production forms and formats never encountered before with all its subsequent collection, mediation and preservation challenges.

In common with national archives, national libraries have generally been among the first major players in the retrodigitization of their collections, a process which began in the 1990s. As a result of increasing funding issues though, they are now at risk of being overtaken by the internet giant Google and large multinational publishers such as ProQuest, unless they change their strategy from relying on institutional self-sufficiency and self-production to an international division of work through transnational cooperation agreements on joint production.

After the US non-profit digital library, the Internet Archive, national libraries (the Royal Library in Stockholm was a pioneer even before 2000) were also among the first to take on responsibility for the collection, preservation and accessibility of digital-born materials on the internet.⁴ Recognizing that developing solutions for this enormous task can only take place through extensive international cooperation, the International Internet Preservation Consortium (IIPC), in which all the Nordic national libraries were co-founders and active participants from the beginning, was established in 2003. The Open Planets Foundation replaced the large, and now completed EU project PLANETS (Preservation and Long-Term Access through Networked Services) from 2011, in which all Nordic libraries have played a part with national assignments.

On the other hand, there are not many national libraries, if any, which have systematically begun to collect, preserve and make available the third category of digitally-born material, namely digitally-produced material in the same (and a few new) categories which have replaced or are about to replace and substitute their parallels in the physical world and can only be acquired through an extension of legal deposit or copyright legislation. Each category has its own particular issues, which far outweigh those which had to be coped with in the physical world. It is my view that the issues facing national libraries in this area form the greatest challenge of this decade, and

⁴ In Denmark this took place with the incorporation of internet harvesting in the new Act on Legal Deposit in 2004, which took effect from 1 July 2005; with that in mind The Royal Library and the State and University Library have established the common, digital institution Netarkivet.dk, which handles the collection and preservation of the enormous digital international base; on the homepage www.netarkivet.dk, you will find an introduction, FAQs, articles and the software Netarchive Suite in open source; see also www.digitalbevaring.dk, published in 2010 by The Royal Library and State and University Library.

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will have a wide-ranging and fundamental impact on the financing, priorities, organization and standing of national libraries.

In this article I shall be examining this question which, like so much else in this world, must be considered to be a preliminary peep into the 'brave new world' that beckons. In this instance, as with the other two digital main categories mentioned above, the necessary developments can probably only be mastered through international division of labour and supranational cooperation. But, thus far at least, no such initiatives have taken place.

THE ROYAL LIBRARY IN 2015

At the end of 2010, the Royal Library entered into a new 'Framework Agreement' with the Ministry of Culture for the period 2011 to 2014. As the basis for the Agreement, a new medium-term strategy was established,⁵ which created a link between the institution's mission and its vision and the objectives in the Framework Agreement. This document is of interest to a wider public, including the Library's many partners, both in a Nordic and international context.

Under the new Framework Agreement, the Royal Library will continue its centuries-old functions as the National Library of Denmark (since 1648) and Copenhagen University Library (since 1482), and will continue to work for education, research and enlightenment now and in the future. Consequently, there are no fundamental changes in the Library's main tasks. But the means of undertaking these tasks will undergo major changes on account of digital developments, the much closer cooperation with Copenhagen University, which has evolved over the past few years, changes in the division of labour in the public sector and increasing cooperation across borders both nationally and internationally. This means that the focus for the coming years will change, with developments pointing unequivocally in a digital direction, even though the Royal Library will still appear manifestly physical during our lifetime.

Over time there have been many definitions of 'the digital library', often rather narrow or inaccurate ones. In terms of the Royal Library, the 'digital library' is taken to mean a library which overall, in principle and in all vital respects, is operated, managed, and administered digitally, where entries and access are digital, where information and the independent mediation of the library, its tasks, content and functions sufficiently and/or exhaustively are digital, where communication channels to users, authorities and one another are digital and binding in a legal sense, and where significant parts of the content can be found digitally.

The majority of the changes that the Library is planning to put into effect

⁵ The Royal Library: Strategy 2011–2014. 2010, 15 pp; will be published on the homepage when the results agreement has been signed by the Ministry of Culture, which has not yet taken place at the time of writing for formal reasons.

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in the years up to 2020 stems from digital developments and will be supported by digital solutions, i.e. to enable the Library to develop its national functions and its functions for users. It is the Library's ambition to meet users and partners digitally wherever they are.

Over the past decade, progress has been most marked in the university sector, but over the next few years we will witness a completely new stage of development within national libraries. The major challenge is that all categories of physical material have now been – or are about to be – superseded by digital parallels.

As central elements in its Strategy for 2011–2014, the Royal Library will develop a digital infrastructure, which will include national systems for collection, preservation and mediation, i.e. the handling of digital-born or created (retrodigitized) material for the four main digital parallels to physical categories: (1) books and periodicals; (2) sheet music; (3) private archives; and (4) images, principally photographs.

THE DIGITAL LEGAL DEPOSIT OF BOOKS AND PERIODICALS

In 2013, the Royal Library and the State and University Library continue to receive the national literature and other types of materials in physical form. But the production and distribution patterns for both fiction and non-fiction are changing as digital options increase. The form of distribution is also now being reflected in usage patterns, where physical usage is being progressively replaced by digital usage.

Major changes are taking place within literature and the traditional book world. Digital production methods have been in place for quite a long time, even although the 'end product' still appears and is sold in analogue physical form. However, digital production methods have not yet been exploited to any noticeable extent in sales, legal deposit or preservation. In cooperation with publishers and the publishing world, the Royal Library is now imminently moving to a position where the digital edition of a printed work will be the basis for a comprehensive national system. This will include all aspects of production, marketing, sales, legal deposit and preservation to agreed standards – and not in parallel systems – for the different elements of production, marketing, sales and preservation systems.

The Royal Library put forward suggestions for a comprehensive national system of this kind in 2006, but the time was not ripe. Now the time has arrived or is imminent. The Royal Library's vision envisages a production, diversified usage and collective national preservation solution, based on supporting one another's functions and responsibilities through partnerships. The advantage to the Royal Library in receiving the national literature in digital form in future is that it will allow for considerable rationalization in the handling of physical materials, optimization of long-term preservation, and the avoidance of expensive future digitization costs since the material will already be available in digital form. The advantage to publishers and

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publishing houses is the creation of a safe preservation and archival function with ongoing monitoring of formats; and an assurance that the content will be migrated to new storage media and to new formats in case of changed policies. This will ensure that the works can more easily be re-issued later on, should this be desired. The concept is based on the Royal Library receiving a copy preferably of the XML marked-off file before it is sent for publication digitally or physically. The Library will guarantee the preservation of the file and will ensure that it will only be used within the law or agreement and in line with the legal deposit law. In return, the publisher will be guaranteed safe access to their delivered files, so that these can be collected and subsequently re-issued. The national infrastructure for dealing with books must be ready for operation in 2014.

A NATIONAL DIGITAL INFRASTRUCTURE FOR SHEET MUSIC

Likewise, the Royal Library has a vision for establishing a comprehensive Danish digital platform for the production, mediation, sale, archiving and preservation of digital sheet music via the web.

In 2007 the music section of the Danish copyright owners' organization, Copydan Tekst og Node (i.e. Text & Sheet Music), approached the Royal Library with a proposal for cooperating on the digitization of written musical works. The purpose was to ensure improved preservation and distribution of Danish sheet music for users, rights owners and the preservation of cultural heritage. The idea is that digital sheet music should be made available to users so that anyone interested can buy copies for their own use. The fees will be used to support infrastructure running costs and the remainder will be distributed to the rights owners. It is intended that the final project should be self-financing.

Copydan Tekst og Node will handle the rights clearance so that more recent publications will also be available, and they will also deal with the distribution of payments to rights owners. Music publishing houses, professional and organized originators must be able to put their material on the web themselves, and the Royal Library must finally place retrodigitized sheet music, including copyright protected material, in the digital sheet music base.

During the initial phase of the project in 2009–2010, a working group comprising representatives of Danish composer and lyric writer organizations and the Royal Library prepared an extensive analysis of the options for establishing the proposed infrastructure. The second phase consisted of fundraising for creating and testing the infrastructure and this has just been completed.

A comprehensive catalogue of works will be established and made available for search, mediation and digital delivery in full text directly to musicians and other users. The technical formats must facilitate distribution to mobile phones, tablet PCs and – in time – directly to the digital music desk.

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The project partners are united in their desire to preserve sheet music and written music culture as part of the comprehensive cultural inheritance. This requires both the production process and the mediation to be digitized. Even now it is no longer possible to find a music shop in Copenhagen where one can buy physical sheet music. For many generations the Royal Library has compiled the national bibliography of sheet music, and it holds the catalogues of all publications and the national sheet music collection, including publishers' archives, just as the Library has the responsibility for preservation. The Phonofile project for recorded music at the State and University Library (now Basepoint Media) has shown the scope for a solution based on cooperation between the national library and commercial distributors. A comprehensive digital sheet music base will be of central relevance to all parties in the music network, including libraries, educational institutions, orchestras, performing artists and individual private users.

DIGITAL CULTURAL AND SCIENTIFIC PRIVATE ARCHIVES

The third major area with an enormous need for developing national and international systems for collection, preservation and mediation is the field of private archives, which includes digital archives from individuals such as authors, artists, administrators and scientists and corresponding cultural institutions. Archives of this kind contain very mixed materials and present challenges that are probably more significant than those for books, periodicals and sheet music.

These archives will contain different types of texts, from different word processing programmes, as well as correspondence from various email programmes, and pictures in diverse formats, all collected from, or in, different professional or private contexts.

In the case of personal archives, the situation differs depending on whether the creator of the archive is deceased or living at the time when the archive is brought into the manuscripts department. In the former case, the problems to be faced are both practical and ethical: how does one incorporate the archival material received so that the original authenticity is preserved; as the department responsible, how does one familiarize oneself with and sort the material, if the archive creator has not done so; and what does one select to incorporate in the collection? Equally, which data formats can be handled and which should be normalized with others; and how does one make the material available to present and future users?

If the creator of the archive is living, the situation is easier since the person can contribute to the arranging, description and sorting of the archive. On the other hand, it does mean that simple and easy transfer mechanisms must be established which will work for the most popular platforms (Windows as well as Mac) and data formats. Furthermore, new types of transfer agreements must be made in which rights both during and after the creation of the archive are settled. And the creator of the archive must be given current

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access to it so that he or she can handle the sorting and can also, for example, use the material as an active archive.

After several years of preparation, the Royal Library's Manuscripts Department was given resources in 2011 to develop a system for self-archiving emails (with attachments) via the web. The system will emulate the traditional archival functions associated with private archives independent of the archive creators' IT platform and personal mail systems. It must be intuitive for anyone experienced in using email, namely practically all users who are likely to build up a private archive of interest to the Royal Library. The system will also protect the Library against any form of direct interference during the archive creator's compilation and delivery of his or her mail archive. In 2009 a number of university researchers were given the opportunity to use a prototype of the system, and their experience has made a very valuable contribution to the development of the project. One specific part of the project will consist of making sure that as much as possible of the original context of individual emails, internet links, and so on, are preserved, which links it more closely to the development of the Danish National Web Archive, *Netarkivet.dk*.

Just as readers taking their own digital photographs is well on the way to replacing requested photocopying in the Royal Library's reading rooms, the long-term aim of the project is to make it attractive to archive creators to build up (select, preserve and arrange) archives with their email correspondence while they are living. However, it is quite clear that the Royal Library cannot limit itself to offering only a single workflow through which the archiving of emails can take place. It is therefore gratifying that the State Archives, on the basis of this institution's different background and functions, is also in the process of developing a public domain tool, SABA. This will facilitate the archivist's work in harvesting, saving, re-organizing and transferring the whole or part of a mailbox from, say, a delivered hard disk or from a running PC to a preservation and mediation service. The developments within the digital private archives field must all take place in close liaison with the National Archives. Unlike the situation in public archives and the creation of public sector archives, neither the National Archives nor the National Library can prescribe forms of delivery or formats for private archives.

THE NATIONAL DIGITAL PICTURE BASE FOR THE CULTURAL SECTOR

In the twentieth century, some national libraries, but far from all,⁶ have established special picture collections for the purpose of actively collecting

⁶ This applies, for example, to the British Library; it does not mean that the Library does not have or receive pictures, but they are included in other categories of material (e.g. archives).

and preserving independent picture forms, i.e. predominantly photographs.⁷ In 1902, the Royal Library established a special Department for Maps and Prints, and today it holds about 18 million photographs, including 5 million aerial photographs, which probably represent more than half of all public photographic collections in Denmark. Now these picture collections are experiencing a crisis, not least conceptually speaking, as a result of digital developments.

Digitally-born images emerged to an extent that began to have a considerable impact on national libraries towards the end of the 1990s, and this development really took off after the Millennium. Digital technology causes fundamental structural changes in the creation of images and in the scope for taking images and in the behaviour of public as well as private institutions and individuals. First and foremost, there is an increase in volume in the number of images taken at the same time and with the same type of motif as with non-digital technology. Whereas previously a single or just a few photographs would be taken, now an enormous number of the same subject can be taken and preserved more or less concurrently.

Since the beginning of the twenty-first century, the development of digital scanning technology and the decreasing costs for scanning physical pictures also mean that private creators and/or owners of physical picture collections can retrodigitize their physical photographs themselves and combine them with their own digitally recorded images.

Should these digitally created images be collected and preserved in the same way as the printed photographs of the past century? If the answer to this question is yes, national photographic collections face a monumental task of selection and acquisition, both in theory and in practice, if only because of the high costs of image storage and preservation.

The issue is put in perspective when one looks at the vast number of images which are collected through the internet harvesting of national web domains, which are connected to homepages and their content. Should one settle for this with the consequence that previous picture collections are reduced to being departments for physical picture forms and retrodigitized representations of such?

As early as the first half of the 1990s, the Royal Library outlined a vision for the construction of a national photographic resource of born-digital or digitally-created photographs and photograph collections worthy of preservation. The time was not right then; everyone wanted to proceed in their own way and, as might be expected, this led to a number of inconsistent and incompatible initiatives, loss of material and complex means of access.

The situation now seems ripe for a national solution since the National Library has had several requests to initiate a solution of this kind, for

⁷ Previous forms were copperplates, but drawings are also often included in picture collections. Since 1999 The Royal Library has collected c. 200,000 cartoon drawings (see Nielsen, 2009).

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example, from public libraries with local archives and collections. This has led to a new acquisitions policy being developed for digital photographs, and to the launch of the first national infrastructure project, *Denmark from the Air* – before Google in 2012. With the island of Funen as a pilot, it will include the digitization of about 250,000 aerial photos from the twentieth century over the period from 2012 to 2013 (see Nielsen et al., 2012).

CONCLUSION

I have outlined above a number of challenges facing not only the Royal Library but national libraries all over the world in the coming years, as the concrete effects of the next step in the digital revolution – the categories of digitally-born material – replace the physical antecedents that have been well known to us for centuries. While physical materials in different formats and paper types in a storage context was a practical/organizational problem and long-term preservation a question of space or – more recently – a substitution/surrogation problem via photographic and in later years also digital copying, receiving digitally-born materials frequently involves new and often far more difficult problems than the physical in terms of receiving, mediating and preserving material. The developments which have taken place over the past fifteen years in university libraries, albeit in a relatively standard form for digital periodicals, for example, have now arrived at the door of national libraries. In many respects, these challenges are more like those of the archival sector in the digital world, but there are still some crucial differences. If we want to preserve the digitally-born part of cultural heritage and knowledge production within these areas in the future, these problems must be solved. We are running out of time if we are to avoid the loss of data and cultural heritage in the coming decades, as indeed has happened on the web in the 1990s.

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