Watching the library change, making the library change? 
An observatory of digital influence on organizations and skills at the Bibliothèque nationale de France

Marianne Clatin  
(speaker)

Louise Fauduet  
and

Clément Oury  
Bibliothèque nationale de France  
Paris, France

Abstract:

Since 2010, the Bibliothèque nationale de France (BnF) has been testing a new way of analysing the influence of handling its increasing digital collections on the way its librarians do their job. ORHION (observatoire des Organisations et Ressources Humaines sous l’Impact Opérationnel du Numérique: Organization and Human Resources under Digital Influence), is an informal “observatory” of challenges and practices in what is usually a very structured, even hierarchical, institution. In this paper, we propose to explain how the library experimented with atypical methods of sharing challenges and practices in the digital domain.

When the national library got a new major building and a complete reorganization in the 1990s, its digital projects were carried out by a dedicated Digital Library Department. But by the mid 2000s, digital had become mainstream: digital projects became digital routines, digital R&D became day-to-day operations. Thus, in 2008, the dedicated Digital Library Department disappeared into various other library services and operations. Digital was just one means among others for the library to fulfill its long-standing missions. However, with digital actions disseminated across the library, there was a lack of a centralized place to discuss shared difficulties and put experiences together.

Throughout 2008 and 2009, the idea of an informal group of librarians interested in sharing their experience of the challenges digital collections posed to their daily activities was put to the test. This group progressively developed into something which was officially endorsed for the long term by BnF’s top management in 2010, and yet unique in its structure and methods at the library, ORHION.

It has since then fostered a spirit of openness about challenges caused by digital collections across the library, along with other concomitant initiatives. Its innovative way of working
may be considered to have helped emerging needs and issues now being embraced across the library and its various entities as well as hierarchical levels.

Part I: The birth of a constellation

“A radically new kind of library”

In the minds of those who first conceived it, the new “Bibliothèque de France” was supposed to be “a radically new kind of library”\(^1\), where digital collections and activities should hold a prominent place. The Digital Library Department was therefore created in 1998, the year when the “Bibliothèque nationale de France”\(^2\) completed its moving into a new major building. This department was globally in charge of all activities related in one way or another to the digital world and the Web:

- Editorial and technical management of BnF’s institutional website (www.bnf.fr).
- Editorial and technical management of BnF’s intranet.
- Development of the digital library system for online access to this material.

Everything was managed by the Digital Library Department, except the infrastructure and storage of the digital material for Gallica, which was in the hands of the IT Department. One year later, the Digital Library Department began giving thought to the legal deposit of online publication and Web archiving.

Digital collections management at the BnF was therefore organized in a vertical way: all processes (selection, acquisition/digitization, cataloguing, access and soon preservation) were concentrated in a single entity. This entity mirrored the “traditional” library that was managing documents on physical media, but it was entirely separate.

From vertical to horizontal thought

This vertical organization was successful as it managed to promote Gallica in the mid 2000s as one of the leading online libraries. However, at this date, it appeared necessary to radically enhance the scale of the department’s digitization activity. The main triggers were the increasing role of digital documentation and the development of high-speed Internet in France. The goal was also to keep pace with the digitization project announced by Google. If a single entity was to support alone such a charge, it would have become a fully different library, as big as the “traditional” BnF was — thus challenging the unity of the BnF’s objectives and missions. On the other hand, as Gallica was no longer an experiment but a leading service, it was obviously necessary to involve the whole library in its management. In order to bring traditional and digital-related library skills closer, a first series of organizational changes were implemented:

---

\(^1\) On July 14th, 1988, François Mitterrand, then president of the French Republic, announced his wish to build “une bibliothèque d’un genre entièrement nouveau”.

\(^2\) The “Bibliothèque nationale de France” or National Library of France comes from the merging of the previously existing “Bibliothèque nationale” and the “Établissement public de la Bibliothèque de France”, a dedicated public institution created in order to design the new library.
- The team in charge of digitization joined the Preservation and Conservation Department, thus facilitating the convergence of reproduction workflows and the shift from analogue (microforms) preservation reproductions to digital ones, and starting to integrate digital preservation as one of the main conservation strategies at BnF.
- The team in charge of the selection and acquisition of books for Gallica was transferred to the Cooperation Department, thus emphasizing the evolution of the digital library towards shared selection workflow and tools at national level.
- The team in charge of managing the digital library’s website and architecture joined the IT Department, which created a suitable environment for scalable processes and formal development methods.
- The team in charge of the BnF’s institutional website joined the Communication Delegation, thus acknowledging the website as a communication channel among others.

A smaller Digital Library Department remained: it was in charge of activities that were very specific to digital collections management. On the one hand was Web archiving, which was still a project and not yet a mission. On the other hand were activities related to what may be called “digital curation” (translated in French as “bibliothéconomie numérique”, i.e. “digital librarianship”). People in the digital curation team worked on innovative ways of referencing and accessing documents, and on digital preservation — both fields implying thorough knowledge of metadata.

Therefore, the Digital Library Department had become in the mid-2000s a kind of R&D department with experts involved in the use and the evolution of digital models and standards such as Dublin Core and OAI-PMH for access, the OAIS organizational model and METS for preservation, and the WARC file format for Web archives storage.

**The Digital Library Department legacy**

A new series of modifications occurred at the beginning of 2008. At this date, mass digitization projects had proved their worth with hundreds of thousands of documents available; a new version of Gallica had been launched, as well as the development process of the software part of the BnF digital repository, SPAR (Scalable Preservation and Archiving Repository). As every part of the library was then involved in digital activities, the existence of a Digital Library Department was questioned.

Discussions occurred in late 2007 about the future of this department, of its activities and staff. The decision was taken by the BnF management board to dissolve it in April 2008 and to disseminate its goals and expertise:

- The Web archiving activity was attached to the Legal Deposit Department, with the birth of the “Digital Legal Deposit” service. The Legal Deposit Department was already in charge of collecting and indexing printed documents, to pass them on to the thematic departments which give access to them in reading rooms and manage relationships with the public.
- The National Bibliographic Agency was reorganized in order to be an actor in digital curation activities. This implied broadening its functions, now involving digital

---

3 The first experiments on Web archiving started seven years before the law on digital legal deposit was passed, on August 1st, 2006.
information management as well as traditional bibliographic expertise, along with reinforcing its ties to the IT Department, then in the process of designing the information system. The importance of these modifications was highlighted by the department’s new name: the Bibliographical and Digital Information Department.

- Finally, the Conservation and Preservation Department strengthened its dedication to digital preservation, and fostered preservation expertise tasks.

On the other hand, the needs of the mass-digitization processes let many more departments be involved in tackling digital issues. Staff working in BnF “collection” departments (i.e. those in charge of acquiring documents and of managing relationships with the general public and researchers) were entrusted with the difficult tasks of selecting the documents to be digitized, according to several legal, scientific and technical criteria, of ensuring that they were not damaged by digitization processes, and of performing some visual quality assurance. They were also progressively involved in the promotion of Gallica, notably by using blogs and social networks. Finally, the same departments were also involved in the selection and quality assurance activities of Web legal deposit.

These various ways of disseminating digital expertise — along with expert staff — really helped in elaborating common approaches for the management of digital as well as other publications. It was proof that “digital was not different”4. However, professionals understood that this well-known IFLA motto had also its dark side. Traditional librarianship issues cropped up again, still as complex, in the digital realm, and needed to be addressed: notably, how to guarantee collection quality, how to train librarians to deal with their new actions and responsibilities, and so on. And yet the disappearance of the Digital Library Department meant that there was no obvious place where these discussions could be held in cross-disciplinary ways by people in charge of the various aspects of digital content management.

Part II: ORHION, its methodology and actions

Throughout 2008 and 2009, the idea of an informal group of librarians interested in sharing their experience of the challenges digital collections posed to their daily activities was put to the test. The spark for such a group was a problem with the scope of a rights management tool that couldn’t be solved without an extensive enquiry across the library to determine its potential users, which no structure was able to do at the time. While debating how this library-wide problem might best be solved, librarians working on the case felt that a larger problem was not being addressed: if digital issues were to be handled by the whole of the library, how did this actually happen, and did it change the way people did their jobs, or even the very nature of their jobs? So volunteers who were closely involved with the issues of digital preservation and rights management came to the human resources services with the concept of a working group studying the impact of the development of digital tasks in the library, and asked for their advice and support.

The group then progressively developed into something which was officially endorsed for the long term by BnF’s top management in 2010, and yet unique in its structure and methods at the library.

Its members are recruited by invitation for their experience and/or interest in dealing with
digital collections and do not represent their department but themselves. They are picked from
the whole library staff. In fact, ORHION has made a conscious and continuous effort to
include representatives that do not come solely from the Direction of Services and Networks,
which gathers de facto the agents dealing the most closely with day-to-day digital operations —
IT, metadata models, digital libraries, digitization, and so on. The Direction of Collections,
which is at the heart of the digital collection management, has provided an increasing number
of members, and Human Resources have been eager to participate from the start, given that
the study of changes in jobs and skills has been the main purpose of ORHION since its
inception. But ORHION has recently recruited members from services which are not usually
included in “technical” debates, such as International Relations or Strategy Delegation, in
accord with the library’s policy that digital issues should be disseminated across the BnF.
The members are not top managers, the library policy-makers, but practitioners and middle
managers. The purpose of this rule is to draw on personal experience of daily operations and
processes, and some members have left the group as they have been promoted. Yet ORHION
felt it was important to have sponsors in top management, such as the head of Human
Resources, in order to warrant that it not be perceived as a loose canon and that it had a relay
for its analyses.

The group operates outside existing BnF structures, since its role is to observe and articulate
the changes in the librarians’ practices and skills, not to elaborate the library’s strategies.
Yet it plays an important role in raising awareness through its four types of action:

- interviews, to gather information on a given subject or work practice;
- working groups, to analyze specific topics — one worked on charting the
  miscellaneous training programs on digital collections;
- workshops, where a few cases on a given theme, such as managing born-digital
  material, are presented to foster a discussion with a large number of participants;
- and last but not least, information for managers, through presentations of ORHION’s
  work in management committees.

Interviews

Interviews were used initially to better define the nature of the issues that ORHION’s
members had perceived instinctively. Were the changes the library experienced due to new
technologies or new management practices? Was there really such a thing as a digital
influence on the way librarians do their job? In which ways was digital different, and ought it
to be?

The first round of interviews was thus aimed at a dozen people considered to be key players in
BnF’s digital domain, to identify what the problems were, and to learn from the ideas and
doubts expressed by the staff working in the digital domain. Six main wishes emerged: 1. clarify
the institution’s policy; 2. define priorities; 3. define what a digital collection is; 4. facilitate
cross-disciplinary workflows; 5. develop skills; 6. analyze the evolutions of job qualifications.

While the first two wishes were the responsibility of the library’s management, and the fifth
wish would be covered by the work of the Training and Qualification Services, ORHION
seemed to find a purpose in focusing on problems that were being felt at the operational level,
and slowly coalescing as the library changed. What do people mean exactly when using the phrase “digital collection”? How has the library made digital processes smoother, when they tend to require collaboration across BnF’s departments and services? How do library workers perceive the changes in their job definitions and in their skill set?

In this spirit, the interviews in ORHION’s 2012 program are meant to observe how the rapid switch from traditional to digital photography has impacted the job of photographer. The BnF has been host to reproduction services for decades, that over time have been part of the conservation services and/or the services to the readers. In time, the lack of maintenance and supplies for traditional film equipment, and increasing demand for digital reproduction, has made film all but disappear in the BnF, with some protest from the collections or the conservation departments. A panel of photographers was selected by managers in the Reproduction and Conservation departments to evaluate whether photographers were similarly ambivalent about the switch. The eight names put forward represent different types of training, careers and mindsets, and the first results reveal an overall welcoming of the changes, especially when highly technical skills about lightning and color are preserved, but a certain wariness towards the pressures of mass digitization.

ORHION’s series of interviews usually have two types of outcomes: an anonymous synthesis presented to the respondents, in order to give them a chance to see that they have not been misrepresented, and a bullet point presentation to managers and human resources who may be interested in integrating the results to their own reflections.

**Working groups**

Another way for ORHION to make headway on an issue is to create a small working group with both its permanent members and specialists invited to participate on their topic of expertise. One of these groups worked on listing the training sessions and tutorials on digital issues, which were organized by different services in the library and lacked some coherence and scope. This task has since then gained visibility and been continued outside of ORHION, as befits the group’s incubation and observation role.

Another working group tried to give a first definition of what a “digital collection” was in the BnF through the study of use cases which seemed to have at their heart such a collection. The aim was to flesh out the notion of “digital collection”, which is used throughout the BnF without a precise understanding of its nature and scope, through the description of concrete examples, such as resolving an error in a document of the digital library, Gallica, verifying the completeness of a Web archives collection, or accessing an audiovisual document that cannot be rendered with existing library players. This also helped to map out the various ways in which structures and individuals dealt with the cross-disciplinary workflows that are one of the major issues in the digital domain identified by ORHION since its inception: how to communicate, how to find adequate tools, and so on. One of the main conclusions was that complexity in the library collections was inevitable, and digital collections were added layers of intricacy; planning for all the stages of the collections’ lives, from acquisition to diffusion, and elucidating and documenting these workflows, was essential. Another point to clarify was the notion of quality applied to digital contents, and how it relates to the criteria for quality in the rest of the collection.
Seminars

This working group was spurred by the previous “seminars”, and fed the following ones: seminars have indeed been ORHION’s most successful type of action in terms of visibility and impact. There have been six in the course of two years, and they mostly followed the same structure: a small number of people, two to six, are invited to share their experience on a given theme during the best part of an hour. Their presentations are followed by an hour of debate with a few dozen people, invited by ORHION from all parts of the library for their involvement in the matters discussed.

The audience is usually free of top managers, in order to reinforce the freedom of speech that prevails. The debates have always been lively, and those who attend appreciate the opportunity to exchange views with colleagues with whom they usually have little interaction, or simply the chance to vent their feelings — which can be a risk to the productivity of discussions. So far, the presence of a moderator and of a minute-taker documenting points of view on screen, picked from ORHION’s members, has been enough to keep the proceedings balanced.

From the anonymous minutes of the seminar, a synthesis is created by ORHION, and the presentations, the minutes and the synthesis are shared with the participants, who are then free to relay them to their colleagues. The themes discussed so far have been a comparison of digitization and Web archiving processes now that they are operating on a massive scale; a debate on whether the BnF’s digital repository could be used for digital curation purposes; an analysis of the library’s practices in interacting with readers, local and distant, around digital contents; an inventory of the diverse ways the BnF deals with its born-digital collections; and two seminars aimed at presenting ORHION’s observations to managers.

Relays

Since its creation, ORHION has indeed been intent on making its observation accessible throughout the library, since it is a group tasked with describing and analyzing what is, not a committee given decision-making powers — which allows it to maintain objectivity, and not to perturb the BnF’s existing structures. The final reports from its projects are public, and its activities are documented on the BnF’s intranet. Special efforts have been made to present those results to the library’s top management, so as to fit in with management’s need for brevity and strategy, such as shorter reports emphasizing observations on organization and policies, or presentations within the BnF’s top-level committees.

The gist of ORHION’s conclusions so far may well be that the more things change, the more they remain the same: while the rise of digital content and technologies has not changed the essential missions of a library — collect, organize, preserve, disseminate —, it forces the BnF to modify the ways it does so. And ORHION has tried to give a clearer picture of these evolutions within an institution where new projects and initiatives sometimes appear suddenly with the effervescence of novelty.

Part III: ORHION and its galaxy — ORHION’s influence, and other initiatives

Having been formed by digital pioneers within the library, ORHION has sometimes appeared to its own participants to be a place where, out of their official department and structure, they could share with other colleagues coping with the same problems, which not everyone was yet
facing. A kind of “digitalics anonymous” group, as the joke goes. A place where, focusing on important topics but far from the urgent daily cases of their own department, people could take time to discuss complex issues at a library level. Both members of the group and people taking part in ORHION’s events were often stimulated, and even relieved, by the chance to discuss their obstacles and successes.

However, the whole of the BnF’s reflection on digital issues does not take place within ORHION’s monthly meetings or its other activities. ORHION’s members do of course act within their own departments. And non-members of ORHION do think and talk about these issues as well, while posting or tweeting, and share with their colleagues, during training sessions related to these topics. But since the observatory has become more well-known through its different activities, the habit has been taken to talk of “a case for ORHION” whenever a case related to both digital and human issues occurs. The observatory name has even given birth to a new adjective and some situations are now said to be “orhionesque”...

While ORHION’s unorthodox rules may once have been the source of doubts on its legitimacy and utility, it has, however, fostered a spirit of openness about challenges caused by digital collections across the library, along with other concomitant initiatives. And as ORHION and its name have become more and more well-known, it is sometimes now unclear what is related to the observatory’s activities and what is not, all the more so when ORHION’s members are involved in a new project, as it was the case in three recently achieved initiatives.

**Updating the official job and qualifications register**

The last of the six wishes which had emerged from ORHION’s first round of interviews was to analyze the evolutions of the job qualifications.

The official register of jobs at the BnF was first created in 2005. All existing jobs are described, belonging to five different groups: public services and collections processing; administration; logistics; communication; management. Several reasons led to its modification seven years later, including the evolution of cataloguing functions, and one of them was the wish to take digital issues more into consideration. A formal study on positions and skills was then performed, paying special attention to the requirements of digital projects. It was, however, decided not to create new job descriptions, but build on existing skills and positions.

What is more, it appears that digital issues and activities come in addition to other already existing ones, and do not replace them yet. Since the missions remain the same, there is no reason so far to imagine entirely new positions, but it is important to describe new skills or processes in existing ones — until the need for some skills might some day disappear.

The job description of librarians in charge of collections, for instance, was changed according to these principles. As far as acquisition is concerned, not only physical collections are now taken into account, but also digital ones, including those the library gives remote access to. Since the law on Web legal deposit that was recently passed, the librarians can also select Web content to be collected. And as well as taking part in digitization processes by selecting documents, they are expected to get involved in social networks to promote both digital collections and services.
The content of every position at the BnF was modified to a certain extent, but the one previously called librarian “in charge of documentary treatments” also had its very title changed, becoming “in charge of documentary techniques and processes”. As far as digital documents are concerned, the whole lifecycle of the document must indeed now be taken into account, for fear that we might soon be unable to access it. It is thus important to master all the processes the document went through, from initial data structure models to the different events which occurred through digitization or transformation into preservation formats. Not only description formats are important today, but also technical and rights management metadata. Not only library formats, but also the publishers’ ones, and those of other communities we want to link with on the Web.

29 job and 60 special skills descriptions were revised this way before the new jobs register was made official in April 2012.

**Developing skills**

Since the BnF decided not to create new types of jobs, it was important to make sure everyone was able to adapt to an evolving position — as the fifth original wish of ORHION went, to “develop skills”.

2009 saw the creation of a dedicated training curriculum in digital information management: metadata, digital libraries, digitization and digital preservation. The idea was first to draw the line between professional open-minded curiosity and actual operational needs. The library was indeed challenged by the blurring borders between previously well separated jobs, and the evolution of the relationship between the functional experts, developers and system administrators of the IT Department, and the majority of the librarians. A comprehensive and flexible training plan was then developed, mixing conferences to several dozens of people, training sessions on computers and smaller seminars where colleagues could share experiences on technical issues.

Classes on the basics of XML, RDF or SPARQL were added, and the more elaborate training program was called “Infonum” (which could be translated as “Diginfo”) and built as progressive sessions: Infonum0 gave the basis of digital information; Infonum1 dealt with the data models of digital information; Infonum2A with the ways the library can develop services on the Web; Infonum2B explained who the remote public of the library is and dealt with accessibility; Infonum2C dealt with the new methodology of digital projects; Infonum3 explained the whole process required from digitization to preservation; Infonum4A dealt with quality management; and Infonum4B gave more explanations on digital preservation through the example of the BnF’s preservation system SPAR.

Between 2009 and 2011, 700 BnF employees (out of 2600) attended at least one of these training sessions, all taught by high-level digital experts inside the library. Four years later, three observations could be made:

- People attending the training sessions often appreciate them, but since some topics are prospective, they cannot directly use the skills they develop after the sessions.
- Other topics are becoming less prospective and are therefore required knowledge for many more employees throughout the library than the experts are able to teach within the current training courses.
- What is more, while it was important, some years ago, to address these digital issues as new ones, it is now paramount that these topics be identified as part of standard 21st
century library issues, and thus integrated into the current librarians’ standard training (as well as that of other people working at the library).

The different departments organizing training sessions on digital issues are now thus involved in reorganizing the training courses according to these perspectives:

- Some topics may no longer be addressed by training sessions, but rather as small lectures to a larger audience. The BnF organizes every week a midday “information hour” on special events at the library (exhibition, acquisition of a patrimonial collection, and so on). Some of these sessions may be dedicated to digital issues, and colleagues could attend more easily than for an official training session, without registration, during the lunch break. There could be an opportunity to give more information on digital projects that the BnF is developing or involved in; to explain which new services are now made possible by the new developments in digitization techniques; or to disseminate ideas on the different ways and places librarians can use to promote their collections and services on the Web.

- Some other topics cannot really be considered as prospective anymore and should be part of already existing non-digital training attended by librarians according to their domain of expertise. Training that describes the library’s collections to staff in charge of acquisitions may now deal with the digital library as well as the physical one and describe the way Internet legal deposit, Gallica and electronic resources are selected according to the classic documentary chart of the BnF. The training designed for staff in charge of collection preservation might also include an explanation of SPAR, the BnF’s digital preservation system, now part of the whole BnF’s preservation plan.

- Some other issues should still be identified as digital ones, but no longer from a technical point of view, rather as part of a broader library culture. However different their jobs may be, managers from different departments should be able to share the same digital basis. The same is true for curators, however different their collections may be, and as well for cataloguers or stack holders. A single training session specially designed for each of these four types of positions might be the opportunity to give to each of them a digital culture adapted to the special issues of their job. A specific session might even be included in the mandatory training course every new employee is expected to attend, which would allow all the non-librarian employees of the BnF to fully understand what the library is now coping with.

Besides these three ways of disseminating digital information throughout the library will of course remain specific digital trainings designed to have people fit the new skills now officially quoted in the official position register of the BnF.

**Digital BnF: “horizon 2015”**

Besides these initiatives led at an operational level, the BnF’s top management decided to experiment with a new way of working to cope with digital issues. As ORHION had already been working for three years, its observations could now be taken into account to fulfill the first original wish of its founders: “clarify the institution’s policy”. This is what the special seminars called “BnF numérique: horizon 2015” were meant to do. Questions about BnF orientations on the various aspects of digital influence were to be addressed by four working groups concentrating on four main themes (more or less following the document processing workflow):

- 1: Documentary chart, acquisitions and collection processing under digital influence.
- 3: Mediation and promotion of the digital collections.
- 4: Organization and human resources under digital influence

Each working group of a dozen people was chaired by a top manager. The other participants were either experts at an operational level or head librarians, on the ORHION model, but at a higher hierarchical level. As with the observatory, non-librarians also participated: functional experts, programmers, lawyers, or members of the Human Resources Department. The department directors involved in the groups were asked to regularly report to the top management and to each other, so that contradictions between the group orientations be identified as soon as possible. They were also expected to give information within their own department about this original experience.

Five meetings were organized in each group during a three-month period in early 2012. It was made explicit that the groups were not supposed to start from scratch, but should learn from the achievements and current reflections already formalized through official documents: a report on ebooks, the recently updated documentary chart, the cataloguing committee working group, the project for a new catalog, a study on the Gallica users, as well as some of ORHION’s notes.

Each group wrote a report to the BnF’s direction on the specific issues it was dealing with. A synthesis of them is now expected from the top management to be first detailed to the seminars’ participants, then to the whole library.

Although the conclusions of the seminars are still unknown so far, most participants already consider that they were a success, from an “orhionesque” point of view. Digital stacks, Web mediation, differentiated processing of collections according to their different origins: all these issues were ones the observatory had already identified as “hot topics”. Since “only” 7 ORHION members were part of the 50 seminars’ participants, and yet the seminars’ debates converged with ORHION’s, it might then be taken for granted that some of the observatory’s reflections are now a common ground shared by several policy-makers.

**Conclusion**

The first of the six wishes ORHION expressed four years ago might be about to be satisfied by the results of these “BnF horizon 2015” seminars. The fourth group, dealing with human resources issues, insisted on the positive role of the observatory as an analysis tool for changes. This might then confirm the role of ORHION in the library’s new digital strategies, having it work on acquisition or cataloguing positions, according to the experience it has acquired in studying jobs already wholly affected by digital issues, such as the current analysis regarding photographers.

What is more, the success encountered by these seminars might prove the relevancy of the ORHION model: a group mixing both librarians and non-librarians, operational experts and managers, whether of top or middle level. As far as digital or IT issues are concerned, a gap is always possible between experts and policy-makers. While the latter are sometimes suspected of not paying enough attention to what are first considered as mere technical problems, there is a risk of a tyranny of the experts, who may find themselves in the situation of taking decisions only they can understand. It is thus paramount to develop places where operational experts and managers can share enough information to enable management to translate digital issues into strategies.
Bibliography
