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The case of digital library

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Governance and innovation in public sector services: The case of the digital library

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Abstract

This paper examines the co-evolution of public governance and innovation, and proposes an adaptation of Hartley's model to take into consideration such co-evolution. This model is then applied to a longitudinal case study of the digitalization of Roskilde University Library. The theoretical and empirical analysis yields four main results. First, it is shown that the transition from a New Public Management approach towards a Networked Governance mode implies a greater distribution of knowledge and innovation across different organisational levels within public administrations. Interactions between such organisational levels crucially affect the development of new public services. Second, a more articulated view of users in public sector innovation is developed. It is argued that: (i) users play distinct roles at different stages in innovation processes, with relatively greater involvement in minor incremental changes; (ii) user-driven innovations have significantly increased with the diffusion of ICTs and Web based public services; and (iii) complex innovations are facilitated by face-to-face meetings between public servants and users. Third, it is suggested that changes in governance modes affect the balance between the different actors involved, thus influencing the nature and intensity of innovation. Fourth and finally, it is argued that the transition towards a networked governance approach requires information policies which persist over time, and are designed to increase collaboration between different (public and private) actors.

Key Words: Governance, Information Policy, Innovation, Public Sector, ICT, Digitalization, Library Services

Highlights:

- We study the co-evolution of public governance and innovation
- We extend Hartley's model to account for this co-evolution
- We focus on organizational change, user driven innovation, and ICT
- We apply the extended model in the library sector and use the findings to improve it
- We stress the role of information policies aimed to promote collaborative innovation

1. Introduction

Previous literature has distinguished three ways of conceptualising public governance, namely the “Traditional” public administration model, the “New Public Management” approach and the “Networked Governance” model (Bennington & Hartley, 2001; Osborne, 2006; Pollitt & Bouckaert, 2011; Røste, 2005; Thomas, 2012). These public governance models (or modes) can be associated with specific patterns of public sector innovation (Hartley, 2005).

Building on these contributions, in this paper we argue that the links between public governance and innovation can be better understood as a co-evolutionary process. The idea is that the two phenomena continuously influence each other over time, and are also affected by changes in the environment. To illustrate this, one might consider the establishment of national health systems (Rosen, 2015, ch. VIII), the launch of big publicly funded scientific projects (Galison & Hevly, 1992), and the modernisation of telecommunications services (Huurdeeman, 2003, part V). These public sector innovations which have taken place throughout most advanced countries in the 1950’s and 1960’s cannot be fully understood without contemplating the simultaneous widespread emergence of hierarchically structured public administrations with a top-down approach to decision making. Moreover, these transformations have been strongly affected by a broader institutional and technological context characterised by the emergence of the Keynesian approach to public spending, by the generalised diffusion of welfare policies in most advanced countries; and by the dominance of scale intensive technology. More recent public sector innovations reflect quite different, less hierarchic and more network-like models of public governance, and substantial changes in technological and institutional contexts. These evolutionary processes have been partly documented in studies on the diffusion of ICT within and across public administrations and in the development of public e-services in recent years (Van Reenen et al. 2010, Arduini and Zanfei 2014, Bannister & Connolly 2015).

However, while extant literature has shown that public governance modes can be associated with specific innovation patterns, previous studies do not fully capture their mutual impact over time, nor do they explicitly take technological and institutional contexts into account. This paper aims to fill this gap in extant literature. To do so, we first review previous contributions and identify Hartley's model - one of the earliest frameworks developed on this topic - as a reference to approximate the links between public governance and innovation. Then we expand and adapt the reference model to analyse the phenomenon under observation (i.e. the co-evolution of public governance and innovation). Finally we apply the (adapted) model to a specific public sector domain - the library service sector - to test and further refine it, taking the insights from the case study into account.

Hence this paper will address three main *research questions*:

- a) How are public governance and public sector innovation interconnected?
- b) How can Hartley’s framework be improved to better account for the links between public governance modes and public sector innovation?
- c) To what extent can such a framework provide useful guidance for the analysis of a specific public sector domain, such as university library services?

The remainder of this paper is organised as follows. Section 2 defines the key concepts used in the paper, and discusses their interrelations. Section 3 reviews the extant literature on the links between public governance and innovation, with a special focus on Hartley’s contribution. This will help address research questions (a) and (b). Sections 4 and 5 are aimed at answering research question (c). In section 4, we justify the use of a case study for the purpose of the present analysis and describe the research procedure and methods. Section 5 illustrates how information policy and innovation processes change in the transition from

what could be roughly identified as a New Public Management phase to the emergence of a Networked Governance approach in the specific case of Roskilde University Library. Section 6 discusses the main results of the case study and proposes some improvements to Hartley's framework, thus providing a more comprehensive answer to research question (b). Section 7 presents some concluding remarks.

2. Defining key concepts and their interrelations

In this paragraph, we both set the context for our analysis and provide some definitional clarity.

2.1 Public governance

There is no universal agreement on a *public governance* definition (e.g. see IFAC (2013)-Appendix B). The one adopted in this paper derives closely from UNDP (1997): "a set of structural arrangements of public administrations (PAs) affecting the allocation of public resources and the degree of efficiency and effectiveness of their activities." Our emphasis is on the relationships between government, public bodies and stakeholders, within and across public organisations, and between the public and private entities. It is widely acknowledged that such relationships play a key role in the pursuit of the public sector's official objectives (e.g., reducing poverty, improving health, increasing education, promoting exports).

2.2 Public sector innovation

We hereafter refer to the EC (2013) definition of *public sector innovation* as "a new or significantly improved public service, communication method, process or organizational method for the supply and introduction of such services." This definition marks a departure from the standard conceptualisations of innovation contained in the Oslo Manual, which had the business sector in mind, particularly privately owned manufacturing companies. Process and organisational innovation in the public sector present important similarities to the private sector, although they may exhibit greater complexity in the case of some public services (Windrum, 2008; Gallouj & Zanfei, 2013). Specific types of organisational innovations are "innovations in governance" (Moore & Hartley, 2010). These consist in new forms of financing, networking and allocating rights in the public sector. They range from relatively circumscribed innovations, such as area forums supporting public sector decision making, to more complex institutional innovations, such as Public Private Partnerships (PPPs) or devolution processes from the central government to the regional and local levels.

The emphasis on product innovation found in the Oslo Manual is replaced by a focus on service innovation, which plays a key role in the public sector (EC 2010). Moreover, different from the business manufacturing and service sectors, public sector outputs cannot be valued at pure market prices. Hence marketing innovations are replaced by "communication innovations" in the public sector. The latter include new or improved methods of promoting an organisation or its services; new or improved methods of influencing the behaviour of and interactions with intermediate and end users (citizens, firms or other institutions); or the initial commercialisation of public services, whenever they are sold to customers.

2.3 The interdependence between public governance and public sector innovation

As anticipated in the introduction, public governance and public sector innovation influence one another over time. On the one hand, public sector innovations may generate complex processes of social change that will eventually lead to the emergence of new modes of public governance. One may envisage similarities between such processes and those that have been identified in theories of techno-economic paradigms (Dosi, 1982; Perez, 1983). New paradigms are initiated by fundamental clusters of innovations (Perez, 1983, Helpman, 1998, Downes & Nunes, 2014) characterised by a series of common features, such as: inducing extensive waves of derived innovations, undermining existing technologies and routines,

destabilising dominant market positions, and generating complementary technological and institutional transformations in the long run. ICTs are widely acknowledged to exhibit all of the features (Harris, 1998; Mansell et al., 2007; Varian et al., 2004). Similar to the emergence of the long cycle of technological change associated with the generation and diffusion of ICTs, major innovations in governance may undergo complex processes of diffusion and institutional matching. As a result, they will eventually concur with major, historical changes in governance modes. Sparse evidence on this co-evolution can be drawn from the literature on the cluster of innovations associated with the diffusion of eGovernment (Arduini & Zanfei, 2014; Bannister & Connolly, 2015) and the diffusion of digital library (Rosselle, 2001; Agre, 2003).

On the other hand, the historical transformations in public governance modes are likely to have an impact on the patterns of public sector innovation. In fact, such historical transformations provide broad avenues that help to identify priorities, and hence, influence the direction and intensity of the technological and organisational innovation that will eventually take place (Acemoglu & Robinson, 2012; Arthur, 2009).

3. Modeling the links between public governance and innovation

3.1 Paradigms of public governance

Different paradigms of public governance have emerged in recent history, each characterised by the distinctive roles of different actors in the social and economic arena, including politicians, public servants and the civil society (see Bennington & Hartley, 2001; Osborne, 2006; Dunleavy et al., 2006; Pollitt & Bouckaert, 2011; Røste, 2005; Thomas, 2012).

Bennington and Hartley (2001) and Hartley (2005) identify three such paradigms which can be sketched as follows:

- a) A “traditional” public administration model, which was dominant post-World War II (WWII) for more than three decades. This model is largely state and producer centred, based on largely hierarchical administrative relations within PAs, and characterised by the passive role of the population, which was seen as a relatively homogenous body of acquiescent consumers of standard services;
- b) The “New Public Management” approach that has been pervading PAs since the mid-1980s. This approach relies on the idea of emulating the private sector, introducing market mechanisms both within PAs and in the relations between the public sector and the population;
- c) The “Networked Governance” model, which emerged in the early 2000s. In this model, the public sector is much more attentive to the pressures, stimuli and opportunities created by civil society, with a greater involvement of users in the service development process.

Osborne (2006, 2010) utilises slightly different labels to identify the first and third paradigm, but adds a significant contribution by characterising the three public governance modes in terms of their theoretical underpinnings. The first paradigm is associated with traditional political science and public policy doctrines, as originally stated by Robson (1928), with a focus on the administrative transfer of political will into practice, top-down decision making and supply-driven service delivery.

The second paradigm (New Public Management) has its roots in public choice (Tiebout, 1956) and in managerial perspectives as theorised by Hood (1991). The resource allocation mechanisms that prevail in this case are market or quasi-market transactions.

The third paradigm (“Networked Governance” using the terminology introduced by Bennington and Hartley, 2001 or “New Public Management” according to Osborne, 2006, or “Public Service Dominant” approach as theorised by Osborne et al., 2013) has its foundations in the institutional and network theory applied to the public sector (Newman, 2001; Powell &

DiMaggio, 1991; Røste, 2005). This stream of literature has taken into account the increasing fragmentation of society and the state, implying that the intra-organisational focus of previous models needs to be replaced by a focus on the inter-organisational relations and interactions between public sector organisations and different players in civil society, including users. A great emphasis is placed on the service nature of most public sector activities and on the role played by Information Technology in facilitating and shaping the interactions between the stakeholders involved in public service development. Although they have different ways of characterising governance modes, scholars generally converge in emphasising that these paradigms reflect distinct ideological perspectives that have prevailed in different historical phases. However, there is substantial agreement on the view that they should not be considered as normative frameworks, implying a necessarily positive and desirable evolution from one paradigm to another. They should rather be considered as competing paradigms that may exhibit a different probability of fit to the institutional, economic and technological characteristics of a given socio-economic system (see Hartley, 2005, p. 29; Osborne, 2010, p. 7).

3.2 Adapting Hartley's model

In this paper it is particularly useful to refer to Hartley's framework, as she explicitly considered the *links between public governance and innovation*. As illustrated in Table 1, which we adapted from Hartley (2005, p. 29), the three paradigms are associated with specific ways in which innovation is adopted and generated. From this perspective, Hartley's model is roughly consistent with the general view that these phenomena tend to co-evolve. In fact, Hartley does - rather implicitly - introduce the idea that some interdependence might exist between public governance and innovation. What is completely missing in her view is another important aspect of co-evolution, that is the influence of more general environmental factors. To fill in this gap, we introduce a *greater emphasis on the institutional and technological contexts in which innovation takes place* as reflected in the first two lines of Table 1. We consider this a fundamental complement to understanding how governance modes may affect innovation.

Table 1. *The links between public governance and innovation* (Adapted from Hartley, 2005)

	<i>'Traditional' public administration</i>	<i>'New' public management</i>	<i>Networked Governance</i>
<i>Technological context</i>	Big science and scale intensive technology	Digitalised networks, internet and emergence of ICT paradigm	Widespread ICT diffusion, Web 2.0, open data
<i>Institutional context</i>	Keynesian deficit spending, welfare state, nationalisations	Fiscal crisis of the State, dominant liberist ideology, privatisations and downscaling of public sector	Globalisation and the changing role of national and local institutions, Growing pressure from civil society
<i>Nature and intensity of public sector innovation</i>	Some large-scale national and universal innovations Large-step changes in services	Innovations in organisational form more than content	Innovation at both national and local levels

	Limited incremental innovation	<p>Push for more efficiency in managerial processes</p> <p>Customer focus produces changes in quality of some services</p>	<p>Both radical and incremental innovations</p> <p>More emphasis on incremental innovation in front-line services</p>
<i>Role of policy-makers</i>	Commanders	Announcers/commissioners	Leaders and interpreters
<i>Role of public managers</i>	“Clerks and martyrs”	Efficiency and market maximisers	“Explorers”
<i>Role of the population</i>	Clients	Customers	Co-producers

On the one hand, some broad changes in technological contexts can be observed during the post-WWII period: a “fordist” emphasis on scale intensive technology and large publicly funded basic research projects in the first phase; growing opportunities and challenges created by new communication infrastructures and ICTs in the second phase; and a generalised diffusion of the internet and Web 2.0 solutions in the third phase (Bernard, 2000; Brousseau & Curien, 2008). On the other hand, institutional settings have also evolved, informing the role of governments and public policy in general. Examples include the emergence of the Keynesian approach to public spending and the generalised diffusion of welfare policies in most advanced countries until the end of the 1970s; the growing attention to the supply side in the final part of the 20th century, which reflected, inter alia, the fiscal crisis of the State and the prevailing neo-liberal ideology; and the fundamental re-shaping of national, regional and supra-national institutions starting in the early 2000s, under the increasing pressure of knowledge-based competition (Stiglitz & Greenwald, 2014).

Changes in technological and institutional contexts help to explain innovation patterns over time. This statement is well founded in economics of innovation in general (Perez 1983, Nelson 1994, Murmann 2003), but it applies to public sector innovation as well. To exemplify, in the four decades most commonly associated with the Traditional PA paradigm (from the post-WWII period to the mid-1980s), one can observe that the nature and intensity of innovation in public telephony services evolved significantly as a result of changes in the technological context (from electro mechanic to electronic technology) and in the institutional context (from quasi-monopolistic public carriers to largely privatised service supply under public regulation in most advanced countries) (Hurdeman, 2003; Rosston, 2012).

As a further adaptation of Hartley’s framework we introduce two simplifications. Firstly we include under the general label of “organisational innovation” several concepts emphasised in the public management literature and alternatively dubbed as “innovations *in* government”, “innovations *in* governance” or “innovations *in* policy making” (Altshuler & Behn, 1997; Hartley, 2005; Moore & Hartley, 2010). Examples include new forms of financing, networking and allocating rights in the public sector (e.g., institutional innovations such as PPPs and devolution processes from central to regional and local governments). Suffice it

here to acknowledge that many important organisational innovations span across and within PAs, and between PAs and other stakeholders; and that these specific types of organisational innovations may be particularly relevant in public sector dynamics.

Secondly we do not consider the distinction, proposed by Moore (1995) and subsumed by Hartley (2005), between innovation and continuous improvement, the line of separation being rather fuzzy and hard to draw from an empirical point of view. However we acknowledge different forms of innovation, including frugal or bricolage innovations (Fuglsang, 2010).

3.3 Using Hartley's (adapted) model to investigate the links between public governance and innovation

Having highlighted how we adapted Hartley's model to the purposes of our analysis, Table 1 shows that the three governance paradigms described earlier may affect innovation in two ways: by changing the *nature and intensity of innovation*; and by modifying *the role of the players (policy makers, public servants and the population) involved in innovative activities*. The *Traditional PA paradigm* has been historically characterised by the design and implementation of large-scale innovation programmes, the introduction of big step changes in technology and policy development inducing radical innovations in service provision. The role of the actors involved was consistent with this innovation scenario. Policy makers were the "commanders" of important innovations, imposing their political will through legislative decision making. Public managers and officers either passively executed the orders received ("clerks") or accepted the pursuit of objectives which may have conflicted with their own beliefs about the wisdom or necessity of the action ("martyrs") (Moore, 1995). Public servants offered a limited contribution in terms of creativity and capability/willingness to improve centrally defined innovation plans and design (Moore, 1995). Citizens and firms were passive users of what was being designed and delivered by PAs.

The *New Public Management paradigm* is characterised by relatively more emphasis on organisational innovation and less on large investments in new technology adoption. Technological innovation was encouraged to the extent that it could increase the efficiency of administrative processes or service provision, and could be facilitated by a technological context in which technology was available for decreasing prices and increasing performance (Bekkers et al., 2006).

The role of the actors reflected the described changes in the nature of innovation processes. Policy makers indicated the objective of improved performance, with an emphasis on the rationalisation of administrative practices and service quality (Pollitt & Bouckaert, 2011). Public managers were efficiency maximisers, whose performance was stimulated by creating new structures of incentives at the different organisational layers within PAs. Users were considered as "customers" whose needs must be explored and dealt with, as their satisfaction became a key element of public sector performance (Hartley 2005).

The *Network Governance paradigm* is particularly fit for contexts characterised by high rates of technological and institutional change. The rapid diffusion of ICTs and the increasing pressures in civil society to decentralise public sector decision making are illustrations of such changing contexts. As a result of these transformations, innovation is more diffused and involves a greater number of public and private institutions than in the other two paradigms. Thus, the changes become unpredictable and harder to "govern" by adopting a top-down perspective (Osimo et al., 2012). Furthermore, the Networked Governance paradigm is associated with both large and small-scale investments undertaken by PAs. The co-existence of technical change driven by sizeable fixed capital investment with substantial innovations not requiring large-scale expenditures can be exemplified by the development of web-based public services. The diffusion of these services was initially favoured by important purchases of IT hardware equipment and the emergence of the internet, and was further facilitated by large, long-run investment projects (as in the case of broadband networking). However, many

remarkable changes in web service design and provision may stem from relatively low cost software developments and organisational improvements in the way services are supplied or used, even in the absence of additional fixed capital investments (Seri & Zanfei, 2013; Van Reenen et al., 2010).

The role of actors was bound to change relative to the other two governance paradigms. In the Network Governance model, policy makers are keen at interpreting emerging technological and social innovation opportunities, thus “inspiring” innovation. Public managers are keys to exploring technologies and innovation avenues. This model is consistent with a bottom-up approach to innovation, and users increasingly become co-creators of new services and processes.

In the remainder of this paper, we use Hartley’s (adapted) model to explore the evolution, over time, of the innovative activities, and particularly the virtualisation processes, which have occurred over more than a decade at a Danish library. We then use insights from this longitudinal case study to reflect on how Hartley’s model could be improved to better take into account the complexities of ICT adoption and web-based service development.

4. Research context, case study and data collection

In this section, we first describe the research context (Danish library sector), then present the specific library under consideration, and finally, illustrate the data collection.

4.1 Research Context: The Danish Library Sector

To illustrate the transition from a New Public Management paradigm to the first manifestations of the Networked Governance model (Hartley, 2005), we used evidence from the Danish Library sector by conducting a longitudinal case study (Yin, 2003) of Roskilde University Library (RUB). The Danish library sector was selected because this domain was the first (and perhaps the most) affected by the information policy programme, “IT Society for all,” launched in the 90s by the Danish national government. This case is therefore particularly apt to illustrate such transition as the Networked Governance model is strictly intertwined with the massive introduction of ICTs and with policies encouraging their diffusion. In the knowledge and education sector this has created great opportunities for the virtualisation of libraries. As we shall show, this process goes hand in hand with the adoption of less hierarchical governance modes within libraries and in their relations with users. Top-down decision making is being gradually replaced, with a greater role being played by intermediate management levels and front office personnel. End users (i.e. professors and students) are also increasingly involved in the co-creation of new web-based services due to their skill intensity. There are two types of libraries in Denmark: public libraries and research libraries. Public libraries promote information, education and cultural activity by making books and other media available to the public (Thorhauge, 2003). Research libraries mainly serve higher education and research institutions, although they are also open to the public at large. In Denmark, there are 20 major research libraries connected to universities and other higher-level educational institutions, and a large number of smaller research libraries connected to other educational institutions. The Danish library system is based on the citizen's fundamental right to knowledge and information. Therefore, both public and research library services are free of charge, but payment may be demanded for special services (Danish National Library Authority).

The Danish National Library Authority (DNLA), an agency under the Ministry of Culture, is the Danish government's central administrative and advisory body for both public and research libraries. It provides statistical information about Danish libraries and acts as the administrative base for Denmark's Electronic Research Library, a major institutional initiative for the Danish libraries' virtualisation process (Danish Library National Authority, Report on “Danish Library Policy”, Ch. 3).

4.2 Research approach - A longitudinal case study of Roskilde University Library

A longitudinal case study was conducted to investigate the relationship between different governance modes and innovation within the research library sector. This approach allows the in-depth investigation of phenomena and provides a rich understanding of them (Walsham, 1995). This choice is also consistent with Yin's (2003) suggestion that three conditions should be considered to choose a proper research method: (1) the type of research questions posed; (2) the extent of control an investigator has over actual behavioural events; and (3) the degree of focus on contemporary, as opposed to historical, events. A case study has advantages over other research methods in answering questions of “how” and “why.” Our research deals with understanding and explaining *how* different governance modes are linked with innovation in the public sector, with a specific focus on the research library domain over a relatively long period of time. Moreover, our study aims at highlighting *why* such links emerge, unravelling the relationships between technological and institutional contexts, governance modes and innovation in the examined case. By highlighting causal mechanisms and links, our case study helps to illustrate a theoretical framework and provides insights for further theory refinement and development. Three main criteria were used to identify and choose the case (Miles & Huberman, 1994). First, the criterion of “purposive” conceptual sampling was applied, as the case had to be suitable to illustrate the adapted version of Hartleys’ framework. Secondly, the case had to be representative of the chosen sector and allow analytic generalisations. RUB is, in fact, representative of the virtualisation process of the Danish library sector, which was first enforced, top down, by policy makers, and then involved partnerships and collaboration among all of the Danish research libraries through Denmark's Electronic Research Library initiative, hereafter identified as DEFF (www.deff.dk). Thirdly, the empirical material produced by the case had to be rich enough for the further elaboration of the theoretical framework, which is one of the objectives of the study.

4.3 Roskilde University Library

Roskilde University Library (RUB) is a research library founded in 1971, serving primarily the students and staff at Roskilde University. The latter is located at about 35 km from Copenhagen, and accounts for about 9000 students, 650 teaching staff, and 430 technical and administrative staff. Regional research and educational institutions, businesses and citizens have access to the library as well (www.ruc.dk). In 2001, RUB moved into a new building, designed by the prestigious Danish Henning Larsen’s Architects Company. Today, RUB has 36 employees. It consists of an 8,000 square meter building, of which 4,500 square meters are for public use, 930 for offices and 875 for closed stacks. In 2013, it had a collection of about 944,000 books and 218,000 AV media, and counted about 4 million downloads. In recent decades, RUB has undergone a virtualisation process initiated by the government in the mid-1990s. This process has substantially changed RUB’s organisation, as well as its services and service delivery by substantially increasing self-services. The library has been re-organised several times over the last decade. In 2015, RUB’s organisation consists of top management (a director and a head of reader services) and four lines (departments), each with a dedicated staff and a department head, also called a line manager. Some employees might belong to multiple lines, thus creating a matrix organisation. RUB can be defined as a “hybrid library,” as it maintains both its physical buildings and a number of face-to-face services, while simultaneously offering an increasing number of electronic services and self-services.

4.4 Data Collection

The data analysed in this study were collected in relation to three research projects. The first project (sponsored by the Danish Research Council, 2004-2007) focused on new organisational forms induced by the adoption and diffusion of web-based services. The second (sponsored by the Danish Research Council, 2008-2012) investigated user driven innovation in the service sector, both public and private. The third (sponsored by Velux Foundation, 2014-

2015) addressed the relationship between ICT, innovation and governance in the service sector. One of the common denominators of the three projects was the investigation of the changes associated with the Danish societal adoption and diffusion of web-based services initiated by the policy plan “IT society for all.” RUB participated as a case in all three projects, providing a rich empirical base concerning the relationship between governance, the evolution of technological and institutional contexts, and the nature and direction of innovation in public (library) services. While the three projects (and therefore, the longitudinal case study) were conducted over a time span of 11 years (2004–2015), the data covered the period from the early 1990s to 2015 through the retrospective recollection of events and episodes by the respondents. Documents and reports covering the same time span were also consulted (e.g., Leonard-Barton, 1990).

The data sources included secondary and primary data (see Table 2). The primary data sources involved: qualitative explorative and semi-structured interviews conducted over a period of 10 years to follow RUB’s virtualisation process; the organisation and participation in meetings with RUB’s personnel over the period 2008–2012; data generated in three “future workshops” facilitated by one of the authors, involving both RUB personnel and library users in 2011; the contents of a blog established by RUB in collaboration with one of the authors for idea generation and co-creation with the library users in 2010; and the continuous observation and use of RUB services, e-services, self-services and building facilities. A total of 21 interviews were conducted. Eighteen were conducted with top management, middle management and librarians at RUB. Three were conducted with two different librarians and a director at two other Danish libraries to gain a broader picture of the links between governance and innovation in this sector. The first interviews (relating to the first project) were explorative. The rest were semi-structured. Most of the interviews were individual, except for three group interviews with either two or four participants.

Table 2. Data Collection Activities

Data Sources	Number or Frequency of Contacts	Description
Interviewee Positions		Organisations Involved
Director	1	RUB
Vice Director	2	RUB
Top Manager	5	RUB
IT Director	3	RUB
Front office librarians	3	RUB
Back office librarians	2	RUB
Members of user-driven committee (4 members)	2	RUB
Director	1	Research library at another university
Librarian	2	Research library at another university public library
Future Workshops	3 (3 hours each)	One workshop with both library users and employees; One workshop with only library users; One workshop with only library employees
Seminars	3	One seminar with user driven committee;

		One seminar with IT Director; One seminar with middle manager and librarian
Meetings	Several over the period 2008-2012	Meetings were aimed: - To plan and implement the blog together with RUB; - To plan the three future workshops together with RUB - To discuss the results
Blog Content Development	Monitored over 3 months	Interaction between a RUB library manager and users to generate innovative ideas
Observation and use of RUB services	Over a 15 year period by one of the authors. Over a 2.5. year period by the other author	Monitoring of RUB e-services, building facilities and Facebook page
Secondary Data	4 2 3 3 3 3 3 3 12	-Internal reports -Minutes of library meetings -Results of user surveys conducted by RUB -Documents about services and e-services provision/innovation -Organisational charts -Strategic plans -RUB statistics on number of books, journals, employees, physical space -Reports and statistics about Danish government policy, DEFF, Library Authority, Danish library landscape
Web sites of DEFF, Library Authority and RUB	Visited regularly over the 10 year period	Worldwide Web surfing and exploration, document download and data mining

To support, complement and verify the interviews and the other sources of primary data, secondary sources were used, including a range of academic, government and library studies and reports on the Danish library sector and its virtualisation process. This material proved valuable for understanding the societal, political, governance and technological trends affecting the library sector, mainly nationally, but also internationally. In addition, RUB provided the authors with data, such as internal reports, strategic plans, minutes of meetings, user surveys, and documents concerning library services and e-services provision. Finally, statistical data about RUB and the Danish library sector were collected from RUB's and the Danish library authority's web sites.

At the beginning of each data collection phase (in 2004; 2008; 2014), a contact was established with a top manager of the library. The top manager invited other librarians/library

managers to participate in the interviews, meetings, seminars and workshops with the researchers, raising the interest of several employees. The criteria for the respondents' selection included involvement in RUB virtualisation and innovation processes at the top and middle management levels, as well as at the front and back office levels (Patton, 1990).

4.5 The Analysis of Data

The analysis took partly place in the process of data collection. We generated field notes immediately after each interview to summarise the key content and to suggest interpretations. The interviews lasted circa 1.5-2 hours each; they were all tape recorded, and most of them were fully transcribed. The three "future workshops" (Jungk & Müllert, 1987) were conducted at the library premises, lasted three hours each and were tape recorded. The posters and post-its produced by the workshops' participants were analysed and summarised in Excel files, and the results presented and discussed in a meeting with two library managers. The blog was observed for a period of three months, and the data were analysed to understand user involvement and co-creation. The data collected in the different stages of research were assembled and shared by the authors in a number of meetings which took place between June 2014 and July 2015. During these meetings, interview reports as well as official documents were consulted and discussed, and frequent brainstorming sessions took place to develop the interpretive framework and process the available information. A preliminary version of the paper has been presented and discussed with one top and one middle level manager at RUB to ensure the external validity of the findings. Using our theoretical framework to organise our data, we analysed the case during the transition from the New Public Management (Phase 1) to the Network Governance (Phase 2). By applying the critical incident technique (Flanagan, 1954), concrete examples (incidents) illustrating Hartley's model have been identified in the data. Some of such incidents were analysed and reported in the analysis where appropriate to illustrate the point.

5. Analysis and Results

The analysis of digitalization at RUB is structured according to the phases and variables of Hartley's (revised) model presented in Table 1. The main findings are detailed in sections 5.1 and 5.2 and summarised in Tables 3(a) and 3(b). The evidence produced is used to answer the third research question (to what extent can Hartley's revised model shed light on the links between public governance and innovation in the library sector).

5.1 Phase 1: New Public Management

The beginning of RUB's virtualisation process largely coincides with what can be dubbed as the New Public Management period (from about the mid-1990s through the early 2000s). The left column of Table 3(a) lists the main characteristics of innovation at RUB in this phase; the left column of Table 3(b) identifies the roles played by different actors involved in innovation over the same time period.

Table 3 (a) -Applying Hartley's model: How the nature and intensity of innovation have changed at Roskilde University Library from the mid-1990s to 2015.

PHASE 1: NPM (mid-1990s-early2000s) with elements of Traditional Public Administration	PHASE 2: Networked Governance (mid-2000s-2015)
Technological Context: Early phase of internet diffusion; Broadband; High investments in ICT infrastructure	Technological Context: Strong and rapid diffusion of the internet and complementary technology (optoelectronics; new data transmission technology)

<p><i>Institutional context:</i> Establishment of Danish Government's Electronic Research Library initiative (DEFF)</p> <p><i>Organisational innovation</i></p> <ul style="list-style-type: none"> - participation in the DEFF consortium, in collaboration with other libraries - moving to a new building in 2000 - increase in number of open stacks - re-training of library staff - changing relationships between front office and back office - blogs for internal communication - increasing interaction with both the IT and pedagogy departments of the university - improvements in managerial processes with more customer focus <p><i>Innovation in service delivery</i></p> <ul style="list-style-type: none"> - introduction of e-services: e-journals; e-books; e-booking - book-a-librarian as an example of customisation of services 	<p><i>Institutional context:</i> DEFF consolidated as a permanent institution under the Library Authority</p> <p><i>Organisational innovation</i></p> <ul style="list-style-type: none"> - hiring of an information specialist with special duty in the service journey - user-driven innovation committee at RUB - extension of library opening hours with possibility of entrance with a library card when library staff is not in service - establishment of a blog for co-creation with the library users - Facebook as a communication tool - Back-office changes - Continuous small changes in front-line services, mainly based on bricolage innovation and listening to users' requirements <p><i>Innovation in service delivery</i></p> <ul style="list-style-type: none"> - Patron driven acquisition - Continuous improvements of services through data analytics and service journey - self-service (self-checkout and self-return) - virtual reference (e.g., electronic chat) - support services for teaching, research and students (assistance with research applications, tailor-made courses on library services) - improvements of book-a-librarian service - establishment of a blog to collect input from users and co-create innovation - Facebook and workshops used as channels for co-creation of new services - continuous improvements of e-services based on interaction with users through log files and pop-up windows
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Innovation

Technological and Institutional Contexts

From the mid-1990s to the early 2000s, the innovation context was characterised by important technological transformations such as the emergence of the internet and the World Wide Web, and the diffusion of ICT and broadband technology in Danish society. This was made

possible by important investment decisions of the Danish government, whose vision was formulated in the information policy plan “Information Society for All-The Danish Model” in 1996 (Vesterli & King, 1996). This plan has been the main driving governmental force of the Danish information society, including the digitalisation of the libraries to provide all Danish citizens with access to electronic resources. According to the interviews conducted over the research period with the top managers of RUB, the most important change in the library institutional context is Denmark’s Electronic Research Library (DEFF), a consortium established to facilitate the innovation and development of electronic library services and the overall objective of improving the use of ICT in support of research and education.

Organisational innovation

At the end of the 1990s -beginning of the 2000s, RUB started an organisational innovation process enacted through three different major initiatives and involving several dimensions of change. The first initiative was RUB’s relocation in 2001 to a new, double in size, modern library building. The new location facilitated an increase in the number of open stacks relative to closed stacks, thus increasing the resources that could be accessed directly by the users, therefore laying the grounds for an increase in library self-services. The second initiative was RUB’s participation in the DEFF consortium. This implied the establishment of partnerships with different Danish research libraries with the purpose of innovating the electronic library services at both the national and local RUB levels as stated in DEFF’s initial strategy: *“To improve the end user’s access to information through cooperation between the Danish special and research libraries. The cooperation includes joint development in cases where cooperation will result in a greater advantage than the sum of local initiatives, including a better and total utilization of the libraries’ resources”* (www.deff.dk, retrieved February 2007).

Such partnerships and service innovations were partly financed by government funding and partly by a joint purchase of licenses (www.deff.dk).

The third initiative was RUB’s collaboration with the IT service department (Campus IT) and the department of education at Roskilde University to develop e-learning. This collaboration was mainly desired by Roskilde University’s top management (but originated in policy statements) due to two major trends: a new vision that research libraries had to become an integral part of a university’s organisation; and budget constraints, both at the Roskilde University and the RUB levels.

These three major organisational innovation initiatives implied changes in staff competencies, with heavy re-training of RUB’s staff and changes in front office and back office tasks.

Innovation in service provision

According to the interviews with the RUB Director and top managers, two important radical service innovations occurred at RUB during this period, in accordance with a shift toward a more market and user-centred strategy and toward an increase in user focus. They were the introduction of e-services and the “book-a-librarian service.” The introduction of e-services provided instant access to e-journals and e-books, 24/7, all year, from the users’ own computers through the use of the World Wide Web. Simultaneously with the introduction of e-services, RUB started innovating its face-to-face services, leading to the development of a new service concept, “book-a-librarian.” This was developed at the initiative of 3-4 librarians in response to the results of a user survey conducted before and after moving to the new building. This service consists of offering the students individual instruction and support in literature and information retrieval within the specific subject/field of the student’s project. The librarian can, for example, offer help in choosing appropriate search strategies and choosing relevant databases, guidance in selecting and evaluating relevant sources, and advice in keeping track of the literature used in the project (<http://rub.ruc.dk>, retrieved Spring 2013).

According to the interviews with RUB top managers and front office librarians, this is one of the first examples of service customisation at RUB.

Role of Policy Makers

The analysis shows that, during this period, policy makers mainly played the role of the “announcers” of societal changes and innovation through the formulation of policy directives. However, they also acted in a way that resembled the “commanders” typical of Hartley’s Traditional Public Administration model. An example of policy makers acting as announcers is the Danish government’s vision and information policy plan, the “Information Society for All-The Danish Model.” An illustration of Danish policy makers acting as commanders is, instead, the establishment of the DEFF (Denmark’s Electronic Research Library). In fact, in May 1996, the three Ministries of Culture, Education and Science established an IT working group to investigate the transformation of the research libraries into electronic research libraries. In 1997, the “DEFF report” was published, creating the basis for potential partnerships for the Danish research libraries’ IT development. This report described a model of reference for Denmark’s Electronic Research Library, including the essential architectural functions and services to be delivered by such libraries. A budget was then allocated by the three ministries, a board of directors was appointed, and a vision and a strategy for the DEFF project were developed. In 2003, DEFF became a permanent activity with the objective of improving the use of IT in support of research and education.

Table 3(b) -Applying Hartley’s model: How the role of the actors has changed at Roskilde University Library from the mid-1990s to 2015.

<i>PHASE 1: NPM (mid-1990s-early2000s) with elements of Traditional Public Administration</i>	<i>PHASE 2: Networked Governance (mid-2000-2015)</i>
Role of Policy makers	Role of Policy makers
<ul style="list-style-type: none"> - Act mostly as announcers, but also as commanders - The info-society for all (1996) creates the guidelines for the start and evolution of the Danish IT society (Announcers) - Establishment of DEFF (Commanders) 	<ul style="list-style-type: none"> - Act as leaders and interpreters of the societal trends, also involving users in policy development - Define the guidelines for continuously changing the library landscape through policy initiatives such as user-driven innovation (see Ogawaet al., 2011)
Role of Public Servants <i>(library managers and workers)</i>	Role of Public Servants <i>(library managers and workers)</i>
<ul style="list-style-type: none"> - Some librarians become top level/middle managers - top level and middle managers implement the changes dictated by the policy directories at the local level to minimise costs due to budget constraints - Librarians and clerks become “martyrs” due to the changes in competences/job 	<ul style="list-style-type: none"> - RUB managers (both top and middle level) act as explorers through a number of initiatives (e.g., “user-driven committee”; a blog for the co-creation of new service ideas; co-creation workshops; supervision and teaching sessions) - Recognition that innovation ideas come from everywhere in the organisation

<p>descriptions that such policy directives imply in their local enactment</p>	<ul style="list-style-type: none"> -Top management provides input to RUB’s strategy and development plans and are the leaders in the most radical of RUB’s innovations - Middle management and front-line employees develop many small incremental innovations (bricolage). Some suggestions may be taken to top management through the biweekly meetings of the coordination committee and gain approval for their implementation throughout the whole organisation
<p style="text-align: center;">Role of users</p> <ul style="list-style-type: none"> - The library users still considered to be fairly homogeneous and a relatively static “client” - Every 5 years get involved with a survey about the library service 	<p style="text-align: center;">Role of users</p> <ul style="list-style-type: none"> - The library users become an important source of innovation ideas: their needs/ wants/ wishes and behaviour are captured and interpreted by librarians in different institutionalised circumstances (e.g., service journey; user-driven committee; supervision and teaching sessions; virtual reference sessions) - Involvement of users in new service development through social media and workshops -The user plays three roles: “resource”, “user” and “co-creator” in the service innovation process

Role of Public Officers/Servants (library managers and workers)

According to the interviews with RUB top management and with both back office and front office librarians, this period was characterised by a transformation in the role of the different actors, within and outside of RUB (see Table 3(b) for a summary of such changes). A key transformation that emerged from the interviews is the changeover of RUB’s top management and some librarians into “public managers”; a transformation of the role of some librarians and library clerks into “martyrs”; and an emerging competition among the top managers of different Danish libraries. For example, the re-organisation of RUB into a matrix organisation requires some librarians to act as top or middle managers (with related decision power), while simultaneously maintaining their role as librarians with front desk responsibilities. In the role of top level managers, such librarians implement, at the RUB level, the changes dictated by the university, the government, the DEFF and the Library Authority. They act as both efficiency maximisers and cost minimisers, especially due to the cost-cutting pressure in the public sector coming from both the Danish government and Roskilde University. They are also responsible for implementing, at the local RUB level, the changes envisaged by DEFF, thus engaging in partnerships or collaborations on specific projects with other Danish libraries. However, according to the interviews with the Library's top management and with the IT Director, RUB’s virtualisation has imposed substantial changes in the competencies, tasks and working procedures of RUB’s personnel. This has resulted in remarkable changes in the number and composition of RUB’s employees over a long period, well beyond the acme

of the NPM phase. Therefore, some librarians and library clerks become, in a sense, “martyrs,” in Hartley's terminology. This is clearly shown by the statistics published on RUB's web site (<http://rub.ruc.dk/en/>); while the number of librarians and subject specialists has been more or less constant in the decades from 1994-2014, the number of clerks had been cut by half by 2014. This is explained by a top manager as follows: “*The spectrum of work for academic staff is widening and taking on tasks that earlier were done by clerks. So there are fewer tasks for clerical staff and therefore less clerical staff*”. (Top manager, RUB, summer 2015)

Role of users

Interviews with top managers and with front-office librarians at RUB revealed that the library user, during this period, was still considered to be fairly homogeneous and a relatively static kind of client, although some examples of service customisation were emerging, as in the case of the “book-a-librarian” service (see above). Consequently, the customer's wishes and wants did not yet play a big role in library innovation activities. The self-service philosophy introduced during this period was based on the idea of letting the user choose from a fixed menu of alternatives. For example, according to a top manager, the only ways in which RUB took the users' needs and wants into consideration was through a survey conducted every five years and through the customer complaints box.

5.2 Phase 2: Networked Governance

The Networked Governance period, which, for RUB, can be dated from the mid-2000s, is characterised by continuous and still on-going changes in innovation patterns and in the role of actors involved. The right hand side column of Table 3(a) lists the main characteristics of innovation at RUB in this phase; the right column of Table 3(b) identifies the roles played by different actors involved in innovation over the same time period. A large fraction of the examined changes, especially concerning organisational innovation, customisation and co-production of library services, are the consequences of an overall visionary change in library support services, as stated in a report by the Danish Library Agency (2008):

“Such library support will entail a shift in focus from supporting the creation of truth to supporting the creation of value. This might mean a stronger focus on supporting inspiration and new ideas as opposed to focusing on quality in support of the search for truth (Danish Library Agency, “Review of Denmark's Electronic Research Library 2008”).

Innovation

Technological and Institutional Contexts

The analysis shows that the technological context in this period is characterised by a capillary diffusion of the internet and complementary technologies in Danish society, its government and its business organisations. The institutional context, instead, is characterised by a gradual transformation of universities into business-like organisations, with boards of directors and activity-based budgets. During this period, Danish universities experienced an increased focus on strategic management, as well as a shift from elected to appointed vice-chancellors, deans and vice-deans (Danish Library Agency, 2008). Indeed, the emphasis on business-like procedures could be categorised as a manifestation of the NPM approach. However, the interviews with RUB top management and with the Director of another Research Library contacted on this issue highlight that this institutional change was associated with a substantial decentralisation of decision making in the area of innovation, and this makes it more consistent with the Networked Governance model according to Hartley's framework.

Organisational innovation

The analysis shows that the Networked Governance period at RUB was characterised by a number of organisational changes both in the back and front offices (front desk). This reflects the organisational requirements dictated by the increasing electronic services and self-services provision. The organisational innovation during this period aimed at better understanding and meeting the users' needs and wants. According to the top management and with librarians at RUB, two instances of organisational innovation are illustrative of this trend. The first is the establishment of the "user driven innovation committee" in response to the policy initiative "User Driven Innovation" in the late 2000s. This committee had the specific task of investigating and understanding the users' needs and providing ideas to innovate the library services accordingly. In the early 2010s, this committee had been replaced by an information specialist responsible for investigating and improving the library users' service journey. For example, this information specialist followed the introduction of the library scanner and provided suggestions to improve its use. . The second example is the extension of RUB's opening hours until midnight, all year around, through the use of an library access card when the library staff was not in service.

Innovation in service delivery

The analysis shows that the Networked Governance period was characterised by radical and incremental innovations in services and service delivery. The main focus was on increasing self-service and co-creation.

Some service innovations were conceptualised, initiated and developed locally at RUB, with or without user involvement. Examples of ideas generated by users include tailor-made courses for teachers and students on how to use computer-based reference programmes such as End Notes and Mendeley, and the establishment of a coffee vending machine at the library premises. The library employees also developed bottom-up incremental front-desk service innovations. Some innovations were discussed by the coordination committee and required approval by top management; other improvements were developed at the front desk and the middle managerial level, without involvement and/or approval from top management. These continuous small changes were mainly based on "bricolage innovation," as a means of satisfying users, but also as a way to make the employees' own work practices easier (e.g., Fuglsang, 2010).

Innovations were also developed within the broader context of DEFF. An example is the "Biblioteksvagten" ("Library Online Service"), which was initiated by DEFF in an attempt to harmonise access to information help across public and research libraries, and subsequently designed and implemented locally at RUB. Biblioteksvagten is an online service whereby librarians from across the country answer questions by e-mail, chat and text messages for 84 hours a week (Biblioteksvagten.dk).

Finally, service co-creation became important during this period, as the content of the library service was increasingly driven and co-created by users. According to RUB top managers a good example of this is the "Patron Driven Acquisition Service," a user-driven service allowing students and researchers to access articles or books that were not in RUB's collection and have immediate access to them (for a fee charged to RUB under a given budget constraint).

Role of Policy Makers

The analysis shows that the policy makers during this period acted as "leaders" and "interpreters of the societal trends" by defining the general policies for the continuous innovation of the service provision in the public sector. An example is the "user-driven innovation" policy of the late 2000s. This was introduced by the Danish government to encourage public administrations and private organisations to involve citizens/customers in innovation processes and activities (e.g., Ogawa et al., 2011).

Role of Public Servants (Library Managers and Workers)

Our case study highlights that, during this period, RUB managers took on the role of “explorers” by engaging in a number of innovation activities based on a high level of user involvement and co-creation. According to an interview conducted with RUB top managers in summer 2015, recent important examples of this trend include the hiring of an information specialist to follow the service journey and to provide an analysis of the users’ activity data (data analytics) for service management and innovation.

However, during this period, top management still maintained a central role by providing input into RUB’s strategy and development plans, and by initiating the most radical innovations. This was mainly done by implementing, at the local RUB level, the information policies introduced by the library authority, DEFF and the government. For example, top management took the initiative to adopt the “Patron Driven Acquisition Service,” even though the users were the key actors in this and other services, as described above and further illustrated below.

Role of users

The analysis shows that, during this period, the role of the user shifted from being static to becoming more active and central in the service innovation process. Such a role develops from being passive, or what Nambisan (2002) defines as a “resource” (e.g., mainly answering a survey), to being “a co-creator.” RUB’s users were formally integrated into the library’s routine activities for New Service Development by taking an active role in the generation and co-creation of innovation ideas. For example, during this period, RUB established a blog on which users could respond to a call for innovative ideas by providing input and commenting on others’ input. In addition, RUB conducted three future workshops wherein library users were invited to generate innovation ideas in relation to RUB’s predefined themes. All ideas generated in these initiatives were evaluated and implemented by the library (See Scupola & Nicolajsen, 2013; Nicolajsen, Sørensen & Scupola, 2016 for further details). RUB also involved students as “users,” according to Nambisan’s (2002) terminology, in testing a new or an improved service, during informal meetings that took place at the Library premises before the service lunch. This reveals a fundamental change in perspective: from a choice out of a fixed menu to the actual design of the menu, i.e., the user was highly involved in the co-creation of the service by adding new quality and content to the service that was being delivered.

6. Discussion of results: Elements for improving the framework

As shown in section 5, Hartley’s (adapted) framework provides useful guidance for the analysis of how the transition from a (spurious) New Public Management mode of governance towards a (tentative) Networked Governance approach has affected innovation in the examined case of library services.

6.1 The persistence of information policy measures

To start with, the framework helped us to organise information and insights concerning the implementation of the Danish national information policy in the examined sector, which was manifested concretely in the DEFF initiative. The case study highlights that *DEFF, as a key information policy measure, had an enduring impact on the overall digitalisation process in the library system and on the development and diffusion of internet-based services in particular.* At the time when it was conceived, this information policy initiative partly reflected the old logic of policy makers as “commanders,” designing large-scale innovation programmes and providing binding guidelines to public managers. This partly corresponded to the relatively newer NPM logic, wherein policy makers are more oriented toward obtaining higher efficiency and more customised services from public servants. It is worth observing that the effects of DEFF persisted throughout the whole decade of observation, and that this

institution also maintained an important coordination role in the Library virtualisation processes during what we identified as the Networked Governance phase.

6.2 Promoting a collaborative approach to library digitalisation

Moreover, the case study has shown that *library digitalisation processes increasingly require the active involvement of more actors and the adoption of a collaborative approach*. It increasingly became a matter of interaction between and across three different ministries, an ad hoc authority, the libraries themselves and other higher education institutions. Greene et al. (2014) report a similar experience of the interactions between government bodies, agencies, libraries and academic institutions in the US. In a different context, Klievink & Janssen (2014) observed analogous patterns of interactions and negotiations between actors involved in the development of public-private information infrastructures at the international, national and local levels. In more general terms, Solum (2009) discussed the broad set of policy issues implicated by the internet, including coordination between the institutions involved in the provision of the infrastructure and services.

6.3 Some stylised facts on how changes in governance modes affect innovation

Hartley’s framework also helps us to appreciate the emergence in time of at least *four “stylized facts” in innovation processes* as library systems evolve towards a Networked Governance perspective. *First*, a transition has been observed from the relatively centralised innovation strategies in the NPM phase, towards a greater participation of different actors within and outside the library itself in the subsequent phase. *Second*, public servants were shown to be less and less passive, albeit efficient, executors of innovation directives, and increasingly play a crucial role as the explorers of new innovation opportunities. This change reflects the enormous potential offered by ICTs and the need to learn through applications. *Third*, and related to what we have just observed, the approach to innovation in the examined library moves gradually from a top-down distribution of decision making power towards greater attention to the stimuli and innovation inputs coming from the front line. *Fourth* and finally, the evolution of the role of users is also consistent with what has been theorised by Hartley. They move from being customers to be satisfied with services designed and delivered by librarians, towards a user-active role able to influence the rate and direction of innovation and often co-produce it (Karlsson et al., 2012; Morrison et al., 2000; Nambisan, 2002, 2008).

6.4 Using the case study to improve Hartley’s model

In table 4 we summarise the modifications and enrichments of Hartley's model deriving from our analysis. On top of our initial adaptation of the model (change 1), the results of our case study highlight three additional sets of analytical issues that need to be tackled in order to improve the interpretive capacity of Hartley’s framework(changes 2 through 4). We sketch below these issues and how they can be tackled.

Table 4 - Summary of changes introduced in Hartley's model

	<i>Change</i>	<i>Description</i>
1	Consideration of technological and institutional contexts	Environmental factors are included to help explain the co-evolution of public governance and public sector innovation
2	Complexities within PAs	Different organisational layers are considered within PAs; multiple public players
3	Better accounting for users	Users play different roles according to innovation stages; their impact on innovation has increased with ICT diffusion; but their contribution is more significant when face to face interaction occurs

4	Endogenising innovation	The nature of innovation depends on the role played by public actors and by stakeholders in the different phases
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Organisational complexities within PAs

First of all, our case study highlights that the transition from a New Public Management approach towards a Networked Governance mode implies a greater distribution of knowledge and innovation across different organisational levels within public administrations.

Interactions between such organisational levels crucially affect the implementation and performance of new public services. We suggest that Hartley's model needs to incorporate such *organisational complexities within PAs*. In her effort to capture the essential nature of governance models, Hartley (2005) articulates a simplified structure of actors, from policy makers, to managers, down to users, without considering the further distinctions between different layers of managers and employees involved in the design, development and provision of new services. This is an underestimation of the innovation challenges and opportunities created by interactions across these different levels. As seen in our case study, front-line librarians often act as gate-keepers in the absorption and interpretation of stimuli from users, experiment with innovations and transfer new ideas to medium and top level managers, who evaluate them and eventually diffuse them throughout the entire organisation. Other innovative ideas mature at the middle and top library management levels as a result of contacts with other libraries and/or other institutions, and are developed in collaboration with front-line librarians. Communication and interaction between organisational levels often turn out to be crucial in shaping and determining an innovation's actual acceptance and performance. These findings are in line with the studies conducted by Jane Fountain (2001) on eGov in the US. They highlighted that innovation in the public sector is not only, nor primarily, a matter of technology being implemented from the top down, but a matter of technology "enactment" involving all of the different levels of PAs. Indeed, Fountain largely disregards the user, but analyses the different actors involved on the supply side (Arduini et al., 2013). More generally, Fountain's contributions are broadly consistent with the literature on the co-evolution of ICT, organisational change and human capital development. The latter strand of literature, so far, has been explored mainly in private businesses, but has also received some limited attention in the public sector (See Seri and Zanfei, 2013).

The changing role of users

A second area illuminated by our case study concerns the *role of users*. Hartley's model needs to be improved in this respect, too. Much like other contributions on public governance, Hartley (2005) identifies different user roles according to the prevailing paradigm, ranging from "clients" to "customers" and "co-creators." One should, however, clarify the circumstances under which each of these roles emerges, and how they change in the presence of new technology and emerging pressures from civil society. Consistent with different other streams of literature, our case study has provided evidence on: the different roles played by users at different stages of innovation processes (Alam & Perry, 2002; Nambisan, 2008), the benefits of face-to-face meetings in user-producer interactions (Magnusson, 2003) and the risks and challenges of user involvement in innovation processes (Nicolajsen & Scupola, 2011; Prandelli et al., 2006). In other words, user involvement is not an easy task, especially in co-creation, as extensively illustrated in our case study. Moreover, our evidence on the increasing involvement of end users in innovations characterised by the fast diffusion of the internet is, by and large, consistent with Nathan Rosenberg's seminal contributions on the role of users in shaping the pace and direction of technical change through their technological expectations (Rosenberg, 1978) and on the importance of learning by using in the

development of new knowledge, especially in the presence of complex technologies (Rosenberg, 1982).

The case study also confirms that advantages are associated with the involvement of users in innovation processes through ICTs, especially the World Wide Web, social media and virtual communities. A few other studies have examined the role of social networks in the changing organisation of information processes in the public sector (e.g. Mergel, 2013) and the measures adopted to increase transparency in the public sector data flows in the US. Similar experiences have been documented more extensively in business services. User involvement spans from web-based surveys and “complaint areas” in the idea generation phase, to “virtual product tests” (Prandelli et al., 2008; Prandelli et al., 2006), to online idea competitions used to create user-adjusted designs of products (e.g., Franke et al., 2008; Ogawa & Piller, 2006). Lego Mindstorm and online gaming are well known examples of the usage of virtual communities in business services (Jeppesen & Molin, 2003) that resemble those we observed in the case of the Roskilde library. In a different context, Osimo et al. (2012) also emphasised the role of end users as promoters of web-based innovations like the ones illustrated in our case study. In fact, with reference to eGovernment, they make a strong argument for the importance of users in driving innovation in public service provision in the age of Web 2.0. Our evidence on RUB further reinforces this concept and highlights that what has been observed in the widely explored field of “eGovernment” is also occurring in the relatively less analysed field of “eLibraries.” One might venture to say that libraries are even more prone to proceed in this direction, given the relatively early diffusion of ICTs in this sector, and the higher skill intensity of both the personnel and users in this field, relative to other public sector services.

Endogenising innovation

Our case study has also provided useful insights on *how innovation can be endogenised* in Hartley’s model. Based on the examined evidence, we could agree on the general statement that the different public governance approaches singled out by Hartley are associated with the specific characteristics of the innovation being undertaken (scale of investment, different emphasis on organisational change, incremental vs. radical innovation). Nevertheless, one needs to emphasise that these characteristics of *innovation are not exogenous, but are largely affected by the role of the actors involved*. For instance, our case study clearly highlights that the innovations initiated by the users or developed with the involvement of the users are mostly incremental in nature. This result is in line with the literature on innovation in business services reviewed by Scupola and Nicolajsen (2013), which emphasised that Web 2.0 favours incremental innovation and reputation, more than drastic technical change. In addition, several innovations described in our case study closely resemble what Fuglsang (2010) has defined as ‘bricolage’ innovation, i.e., improvements and problem solving on the spot, using existing resources.

7. Conclusions and implications

The paper has taken inspiration from Hartley’s contribution to answer three key research questions.

To answer the first question (how are public governance and public sector innovation interconnected), we have proposed a co-evolutionary perspective wherein public governance and innovation influence one-another over time, and are affected by changes in technological and institutional contexts. We have shown that this view has similarities with what has been theorised in the case of innovation in business services, and helps describe different historical phases of PA transformation.

To answer the second question (how can Hartley’s framework be improved to better account for the links between public governance modes and public sector innovation), we have

highlighted that more attention should be given to the role played by *technological and institutional contexts*. In fact, these environmental factors have a significant impact on governance modes, on the role of the actors and on innovation patterns in the public sector. More specifically, we have shown that governance modes are strictly interwoven with the wider diffusion of ICTs and the internet, and with information policy at the national and local levels. To answer the third research question (to what extent can such a framework provide useful guidance in the analysis of a specific public sector domain), we have applied Hartley's model to investigate the links between public governance and innovation in the case of Roskilde University Library (RUB). Based on this case study we have drawn additional insights on how these links can be modelled. Consistent with Hartley's framework our analysis shows that, in the case of RUB, the transition from the "New Public Management" phase towards a "Networked Governance" phase is associated with: (a) greater participation of different actors within and outside of the library itself; (b) a more active role of public servants, who increasingly become explorers of new innovation opportunities, especially in consideration of the potential offered by ICTs and the need to learn through applications; (c) a gradual move from a top-down distribution of decision making power towards greater attention to the stimuli and innovation inputs coming from the front line; and (d) an increasing involvement of users, who become more and more able to influence the rate and direction of innovation and often co-produce it.

Furthermore, our analysis has made it possible to identify several improvements and extensions of Hartley's framework. First, we have argued for a better account of the organisational *complexities within PAs*, well beyond Hartley's juxtaposition between policy makers and public managers. Our findings show that the transition from a New Public Management approach towards a Networked Governance mode implies that new ideas increasingly originate from different organisational levels within PAs. Hence, communication and interaction between such organisational levels turns out to be crucial in determining the actual acceptance, implementation and performance of new public services.

Second, we have improved Hartley's model by clarifying how users affect public sector innovation. Based on our findings, we argued that: (i) users play distinct roles at different stages in innovation processes, with relatively greater involvement in the case of service implementation and minor incremental changes; (ii) user-producer interactions, and even the generation of user-driven innovations, have significantly increased with the diffusion of ICTs and Web 2.0; but (iii) more complex innovations are facilitated by face-to-face meetings between public servants and users.

Third, a further extension of Hartley's model consists in a more explicit effort to *endogenise innovation*. Our findings suggest that changes in governance modes, by affecting the balance between the different actors involved, also has an impact on the nature and intensity of innovation. In fact, to the extent that users increase their role in the development of new public services, the relative importance of incremental and "bricolage" innovation also increases. Moreover, the wider involvement of different levels of PAs in service design and development goes hand in hand with the diffusion of information and competencies within PAs, hence multiplying the *loci* of idea generation and innovation.

Our findings also have important *public policy implications*. The case study has highlighted that the *persistence of information policies* is a key factor for effective innovation in library services in the transition towards a Networked Governance mode. For instance, we have shown that the DEFF initiative has maintained a fundamental coordination role throughout the whole decade of observation, and has guided and stimulated the process of library virtualisation. Moreover, our analysis has illustrated that the coevolution of governance and innovation in the library sector has involved an increasing number of institutions, including different ministries, a dedicated agency and various academic bodies, which were all induced

to adopt a *collaborative approach*. This finding suggests that the so-called “internet governance” implicates not only public information policy initiatives concerning the set up and regulation of infrastructure and the contents that are transferred through such infrastructures, but also encompasses the creation of incentives for different institutions to collaborate and pursue common objectives.

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