

This is the final peer-reviewed accepted manuscript of:

Annalisa Pelizza, *Developing the Vectorial Glance: Infrastructural Inversion for the New Agenda on Government Information Systems*, in “Science, Technology & Human Values”, Vol. 41(2), 2016 298-321.

The final published version is available online at:

<https://doi.org/10.1177/0162243915597478>

Rights / License:

The terms and conditions for the reuse of this version of the manuscript are specified in the publishing policy. For all terms of use and more information see the publisher's website.

This item was downloaded from IRIS Università di Bologna (<https://cris.unibo.it/>)

When citing, please refer to the published version.

Developing the Vectorial Glance

Infrastructural inversion for the new agenda on government information systems

Annalisa Pelizza

ABSTRACT

Integrating information systems (IS) has become a key goal for governments worldwide. Systems of ‘authentic registers’, for instance, provide government agencies with information from databases acknowledged as the only legitimate sources of data. Concerns are thus arising about the risks for democratic accountability constituted by more and more integrated governmental IS. Studies call for a new research agenda that investigate the redistribution of authority and accountability entailed by interoperable IS. This paper contributes to this endeavor by suggesting the ‘vectorial glance’ as a research framework that works along two lines. First, by recovering the STS notion of ‘infrastructural inversion,’ it looks at the technical minutiae of interoperability projects as strategic sites where institutional shifts – and eventually state transformation – can become visible. Second, by defining interoperability as a performative process of boundary reordering, it opens research to the possibility that institutional identities be reconstituted along different lines. Just as vector graphics are based on paths that lead through control points without being bound to underneath pixels, so the vectorial glance runs across boundaries *without implicitly assuming they are immutable and/or a priori relevant for the analysis*. The article draws on a case study observed while working at a major project of civil registers integration in Italy.

KEY-WORDS

information system, interoperability, infrastructural inversion, performativity, state formation, institutional change

1. INTRODUCTION

The integration of governmental information systems (IS) transforms the order of relations among government agencies, between them and their private suppliers, and eventually between states and citizens, whose data are exchanged. Given the recent intensification in the integration of governmental IS, it may be surprising to realize that few have researched this field through the analytical lens provided by Science and Technology Studies (STS).¹

Drawing on the STS concepts of ‘infrastructural inversion’ and ‘performativity,’ this paper contributes to those studies, done in various disciplines, that ask how we can investigate the redistribution of authority and accountability entailed by making government IS interoperable. The paper suggests a framework – the ‘vectorial glance’ – that looks at the technicalities of government information infrastructures as sites where shifts in authority and accountability can become visible. Complementarily, by defining interoperability as a performative process that reorders institutional boundaries, the vectorial glance acknowledges the possibility that actors’² identities might be reconstituted along different lines. As vector graphics are based on paths that lead through control points without being bound to underneath pixels, so the vectorial glance runs across boundaries *without implicitly assuming they are immutable and/or a priori relevant for the analysis*. For this reason, the vectorial glance eventually views interoperability-aimed projects as strategic sites to trace micro-evidences of state transformation.

Interoperability is a widely recognized goal of contemporary eGovernment policies (OECD 2011; United Nations 2010). In 2012, the first principle of the Whitehouse’s ‘Digital Government Strategy’ stated that ‘to harness [federal information] value to the fullest extent possible, we must adopt an information-centric approach to digital services by securely architecting for interoperability and openness from the start’ (US Federal Chief Information Officer 2012).

‘Interoperability’ thus refers to the enabling infrastructural layer making use of standards and protocols to allow the exchange of data. In the public sector it is defined as ‘the ability of government organizations to share and integrate information by using common standards’ (United Nations 2012); or as ‘the ability of information and communication technology (ICT) systems and of the business processes they support to exchange data and to enable the sharing of information and knowledge’ (European Communities 2004, 5).

While interoperability focuses on the enabling layer, ‘integration’ means the actual sharing of data through diverse applications, in order to generate multiple information flows that optimize the re-use of one source (European Commission 2003, 2013). In governments, for instance, ‘systems of authentic registers’ provide agencies – in the fulfilment of their institutional duties – with information from databases that have been labelled as the only legitimate (‘authentic’ or ‘key’) sources for that kind of data (De Vries 2012). For example, welfare agencies might be allowed to use only personal data taken from a national civil register labelled as ‘authentic.’ For the purpose of this paper, we won’t distinguish between ‘interoperability’ and ‘integration,’ but use them as synonyms.

Interoperability-aimed projects are giving renewed impetus to early eGovernment initiatives from the 1990s, which were aimed at streamlining organizational back-office procedures. As for eGovernment activities (OECD 1998, 2003), current integration projects are conceived of as a set of processes to reform bureaucracy, achieve efficiency gains and save public resources by automating internal office tasks. However, these programs also raise economic and democratic concerns. On one hand, despite the persistent undertone of modernization, independent reports tell a different story from that of cyber-hype. It is the story of few accomplished projects, many abandoned ones, and of even more projects exceeding planned resources. Consequently, analysts have wondered to what extent the

leakage in the pipeline is a constitutive trait of digital government programs at large (Bartis and Mitev 2008; Heeks 2003; OECD 2009; Pelizza and Hoppe 2015).

On the other hand, concerns about the surveillance potentials of densely integrated IS are rising worldwide. If it is true that Edward Snowden's revelations have raised worldwide awareness about the disproportionate capabilities for tracking personal information retained in the hand of intelligence services – and of their privately hired contractors, no less intrusive capabilities are becoming available for rule-of-law-compliant bureaucratic procedures. In the face of no technical limits to information matching, this is a situation where juridical awareness cannot do anything but limp behind, and leave wide unregulated grey areas. As Prins, Broeders, and Griffioen (2012, 278) point out,

the dynamic, flexible and adaptive nature of a network makes it difficult to coordinate and control. It is therefore also very difficult at times to decide who is responsible for specific information about citizens that circulates in networks. Who has 'ownership' and is responsible for safeguarding the accuracy of that information?

Following these two distinct reasons of concern – economic and juridical, trends in scholarship are emerging that question the actual potentials of information and communication technologies (ICT) to efficiently and democratically reform the 'government machine' (Agar 2003). This paper contributes to this debate by recalling that departing from technology-driven approaches does not mean neglecting the technical details of infrastructures. We suggest that any attempt to cope with political transformations happening along with more and more integrated information infrastructures cannot avoid accounting for the arrangements allowed, facilitated or hindered by technological artefacts. On the other hand, the paper allows for agency and change in a field that tends by definition to conceive of institutional identities as stabilized once and for all.

The next section discusses the ‘information Government’ (iGovernment) scholarship as an emergent approach that claims to concentrate on information flows, rather than on technologies. Prompted by efforts to get over technological determinism, ‘iGovernment’ authors are renewing the research agenda on the digital government by raising compelling questions about the redistribution of authority and accountability entailed by densely integrated IS. Despite its merit in recovering political concerns, we argue that iGovernment avoids accounting for the material conditions of such redistribution. The section thus introduces the concept of ‘infrastructural inversion’ and its contribution to the vectorial glance. Section 3 frames interoperability as a process of institutional reordering, and introduces performativity as the second characteristic of the vectorial glance. Since in abstract it is possible to say very little, Section 4 briefly introduces the methods of data collection, and Section 5 presents and discusses a case study that draws on the author’s participant observation working at a major program of civil registers integration in Italy. Section 6 discusses the case as an example illustrating the strengths and weaknesses of the ‘vectorial glance’ approach. Finally, Section 7 draws some conclusions and suggests further directions of analysis.

2. A RENEWED RESEARCH AGENDA FOR THE ‘INFORMATION GOVERNMENT’

One recurrent criticism moved by diverse scholarships to early eGovernment initiatives addresses their dominant technology-driven approach, with its exclusive emphasis on the mechanisms needed to achieve tighter technical integration. The eGovernance paradigm, for example, has highlighted that eGovernment projects have usually failed to acknowledge the socio-political implications of digitization. Dunleavy et al. have advocated for a ‘digital era governance,’ a constellation of ideas that have ‘effects not in any direct technologically determined way but via a wide range of cognitive, behavioral, organizational, political, and cultural changes that are linked to information systems, broadly construed’ (2006, 468).

Similarly, Dawes (2009) has pointed out that over the last 30 years eGovernment research has addressed narrowly defined categories of concern (e.g. government organization, service provision, interoperability), while it has avoided asking what constitutes an appropriate infrastructure for the development of governance in the digital age. More specifically, in their study of the Swedish patient record dossier, Hellberg and Grönlund (2013) have shown that interoperability does not simply deal with the distribution of information, but it can work as detonator of controversies among incompatible values.

Scholars at the intersection of engineering and public administration have focused on the political implications of back-office integration, as well. De Vries (2008), for example, describes power struggles among government agencies over control of data flows in situations in which geoICT³ become a key resource for governmental organizations. Drawing on similar evidence, he calls for more research that address how power vested in geoICT can affect cooperation between agencies. Similarly, Bekkers (2007) explores the political nature of back-office integration in four Dutch projects, and suggests a correlation between struggles over power redistribution and (un)successful outcomes of ICT projects.

Another emergent scholarship that tries to look at processes of digitization of governmental IS from a holistic perspective is the 'information Government' (iGovernment) paradigm. Claiming it as an approach that concentrates on information flows, rather than on technologies, Mayer-Schönberger and Lazer (2007) have proposed the iGovernment paradigm as a conceptual lens that brings into focus the interaction between information and power redistribution. Since organizational structures are usually built around the necessities and constraints of information, the advocates of iGovernment point out that the integration of information flows usually entail hierarchical changes:

[t]he freeing of informational flows may [thus] undermine particular grouping and hierarchical principles. Organizational structures that were necessitated by a desired

flow of information – grouping people together and with their information resources, as well as putting them in defined hierarchies to steer the flow of information a particular way – may lose their legitimacy. (Mayer-Schönberger and Lazer 2007, 6-7)

While this is a rather neglected view in eGovernment studies, it is a well-known argument in the STS literature on IS and organizational change (see below), and by studies on the ‘Information Society’ (Castells 1996). For instance, Van Dijk explicitly assumes the co-extension of information and power flows: ‘all the relations between the different actors of the political system can be interpreted both as political relations (of power) and as relations of information and communication’ (2012, 102).

By acknowledging the co-extension of power and information flows, iGovernment-informed approaches are trying to shift the focus of the digital government research agenda. Prins et al. (2011), for instance, in a public report for the Dutch Scientific Council for Government Policy, have called for a discussion on the dependencies, vulnerabilities and political implications brought about by the everyday development of the information government, which is not regulated by any strategic plan, nor by holistic legislative frameworks. Pointing out the increasing gap between *de facto* practices and formal procedures, these authors highlight that no vertical organization of accountability corresponds to the horizontal flow of information in data networks. In the field of care, security and service, for example, there are no limits to information gathering and distributing, and information networks proliferate uncontrolled.

What is interesting in this research line is that new compelling questions arise out of *concerns about how authority and accountability are redistributed throughout information flows*: ‘who has “ownership” and is responsible for safeguarding the accuracy of [citizen] information’ (Prins, Broeders, and Griffioen 2012, 278)? How can governments safeguard the quality of information and ensure the trust of citizens in the longer term? In public-

private systems of pooled information, how is it possible to keep the accessibility of the stored information in line with the necessity and authority to do so?

In summary, in the landscape of studies on interoperable government IS, the iGovernment approach has the merit of updating the research agenda to pressing political concerns. It does so by advocating for the need to question authority redistribution, the renegotiation of the citizens/government contract, and the new public/private hierarchies emerging from integrated information infrastructures.

Nevertheless, by assuming information flows as starting points of analytical reasoning, this framework does not pay much attention to how flows themselves are produced. In its endeavor to replace technology with information flows, iGovernment avoids accounting for the material conditions that allow, facilitate, or hinder alterations in the order of institutional relationships. However, when information flows run across organizational boundaries, the result is a novel, invisible and unnoticed geography inscribed in IS by means of firewalls, web services, XML schemas, WSDL files. Crucially, this geography is not represented in any conventional map: not in constitutional charts, not in privacy laws, not in organizational diagrams, not even in political agendas. Therefore, describing this geography through its own technical tools is paramount if one wants to account for the redistribution of authority and accountability in government infrastructures.

This is where an STS approach – with its attention to processes of techno-social production and consumption – can best supplement methodological insights. The vectorial glance that we are here proposing recovers what Bowker and Star named ‘infrastructural inversion’: it pleads for the need to recognize ‘the depths of interdependence of technical networks and standards, on the one hand, and the real work of politics and knowledge production on the other hand. It foregrounds these normally invisible Lilliputian threads and furthermore gives them causal prominence in many areas usually attributed to heroic actors’

(Bowker and Star 1999, 34). In other words, the vectorial glance suggests looking at the technicalities of infrastructures as key sites where shifts in institutional authority and accountability can become visible.

3. INTEROPERABILITY AS PROCESS OF INSTITUTIONAL REORDERING

As Nograšek and Vintar (2014) have pointed out, practices of information exchange cannot be described only by looking at processes taking place inside single organizations. Since interoperability by definition transcends organizational boundaries,⁴ how can we account for technological processes that require an analytical scope that follow the trajectory of information flows as they cross existing boundaries?

Here is another regard in which the STS approach can supplement methodological insights. In the anti-essentialist STS tradition, interoperability is not a goal to achieve, but an intrinsic trait of any infrastructure. In Star and Ruhleder's list of nine attributes proper to all infrastructures, one is 'scope,' that is, the capability of any infrastructure to reach beyond a single event in time, or beyond a site practice (1996). Similarly, Bowker and Star recall that the ubiquity of classification schemes and standards implies that none of them stands alone: '[s]o a subproperty of ubiquity is interdependence, and frequently, integration' (Bowker and Star 1999, 38).

If interoperability is by definition an entrenched characteristic of infrastructures, what is then that form of 'interoperability,' which the US Federal Chief Information Officer, the United Nations, and the OECD conceive of as a key goal? We suggest that it is a performative process of institutional reordering that redefines boundaries between actors.

The notion of performativity expresses the idea that actors and categories do only exist for the lapse of time during which they are enacted through actions that require some material embodiment (Butler 1997; Latour 2005). Since the seminal work by Kling (1991), STS literature on IS has highlighted the performative characters of ICT adoption

(Baskerville, Stage, and DeGross 2000; Bloomfield et al. 1992; Bloomfield and Vurdubakis 1994; Hanseth et al. 1996; Orlikowski and Robey 1991; Orlikowski et al. 1996; Walsham 1993; Walsham and Sahay 1996, to quote the earliest wave). These studies have addressed the duality of structure and agency, and largely shared the claim that ‘structures [i.e. rules and resources] of technology use (technologies-in-practice) are not fixed or given, but constituted and reconstituted through the everyday, situated practices of particular users using particular technologies in particular circumstances’ (Orlikowski 2000, 425).

However, while sharing the performative stance as a theoretical starting point, only a fraction of these studies has empirically reported transformations in the order of trans-organizational relations following the adoption of new IS. Most of them have either focused on computer-supported intra-organizational change, or have emphasized reproduction, path-dependency (Hanseth et al. 2006; Kallinikos 2004), and conservation (Agre 2004). Sahay, Aanestad, and Monteiro (2009), for instance, have described cases of ‘asymmetric integration’ in which the uneven distribution of power and resources among stakeholders in the Indian healthcare system was reproduced in the adoption of more or less advanced techniques for data integration.

As Orlikowski recalled in the above citation, it is mainly STS user studies that highlight the transformative character of practices of information technologies adoption. Oudshoorn (2011), for instance, has shown that the introduction of telecare technologies has not simply meant the 1-to-1 replication of the extant order of care. Rather, it has challenged professional boundaries and patterns of task distribution.

Nevertheless, when it comes to government relationships, the most systematic contribution to a performative understanding of IS comes from the historic literature on state formation (see Carroll 2006; Mitchell 1991).⁵ Mukerji (2011), in particular, has described how in seventeenth-century France the production and circulation by low-rank bureaucrats

of paperwork files on territorial measurements contributed not only to building a more efficient state administration, but also to reducing the authority of the nobility. With the introduction by Jean-Baptiste Colbert of low-rank experts in charge of collecting and circulating territorial information, traditional information flows originated by nobles were bypassed. In other words, with the circulation of paperwork files the same boundaries between nobility and bureaucracy shifted: providing the King with territorial measurements was not part of the tasks of the nobility anymore, but of those of the newly hired bureaucrats.

Similar historical analyses emphasize the performativity and material embeddedness of activities of state formation. State and actors are not defined by their inner attributes; rather, the boundaries of what ‘state’ is are enacted through material practices: frontier building, tractates negotiating, archives reordering, maps drawing, territories measuring, bodies labelling. To the extent that today’s interoperable digital infrastructure performs functions similar to seventeenth-century France’s paper documents, we can likewise assume that the boundaries between existing governmental actors are performed throughout processes of integration of governmental IS.

Therefore, in order to answer the iGovernment question (i.e. how are authority and accountability redistributed), *the vectorial glance suggests not following information flows as they cross institutional boundaries, but rather looking at how boundaries between actors are re-enacted as a result of practices of information integration.* This is the second characterizing point of the ‘vectorial glance,’ which gives it its name. As vector graphics follow paths that are not bound to underneath pixels, so the vectorial glance runs across boundaries *without implicitly assuming them.*

This understanding has theoretical consequences. It implies looking at processes of integration of governmental IS not as mere facilitators of existing inter-organizational relationships, but as performative activities of institutional reordering. If boundaries are

performed each time anew, the resulting actors (e.g. departments, ministries, local authorities, suppliers) *might or might not overlap with the previous ones*. For example, when municipalities' IS are integrated with cadastral ones, what is 'municipal' and what is 'cadastral' have to be defined anew by means of domain ports, certificates, firewalls, endpoints, XML schemas. The resulting actors/tasks arrangements can replicate the previous one in a 1-to-1 relationship, or it can not.

As in a movie, change can become visible by juxtaposing still pictures drawing different boundaries. As Waterton has pointed out, the possibility of transformation is always inherent to a performative understanding:

performativity implies that things need to be done and redone to have a presence in the world. However, this does not necessarily mean that they are identically replicated: change is also integral to this doing of things. [Performance] is a term that allows for agency and change, for the new to enter in, even within a repetition of action. Performances, in other words, always end up being subtle and flexible improvisations rather than strict replications of existing realities (2010, 650-1).

In summary, by adopting a performative stance on processes of integration of governmental IS, the vectorial glance suggests that the iGovernment question (i.e. how are authority and accountability redistributed?) might have broader implications. Interoperability-aimed projects might serve as ideal sites not only to answer the question about the redistribution of authority and accountability, *but also to trace institutional shifts and eventually micro-evidences of state transformation*. The next sections exemplify the vectorial glance against an empirical case, and describe a process of database integration that eventually entailed a transformation in the order of relations between local and national authorities.

4. METHOD

The case described below reports data drawn from the author's participant observation conducted from 2010 to 2013, during the implementation of a major project of integration of civil registers in Italy. In particular, between mid-2012 and mid-2013 the author spent the most part of her working time collaborating on those parts of the project that took place at the regional level. Part of the material comes from her collaboration with a regional government in Italy that has traditionally been among the forerunners in the informatization of the public sector.⁶ The material is integrated by observations at other regional governments, as well as at the national and local scales.

Data were collected by means of a variety of techniques, since the author was involved in the daily running of the project. These include analysis of some 60 juridical, technical and informative documents issued by national and regional authorities; analysis of an uncountable number of e-mails; annotations during observations and regular (formal and informal) meetings with project managers, civil servants and executives at the municipal, regional and national level, and with contracted developers, suppliers and advisors at the regional and local scale.

Furthermore, plenary meetings were held on behalf of the regional government by a small team of collaborators including the author, with the aim of illustrating the implications of the project and recording stakeholders' reactions. Nine meetings oriented to 348 municipalities took place from October 2012 to February 2013; two plenary meetings in early 2013 were aimed at authorities-as-users;⁷ one meeting in December 2012 involved 38 suppliers developing personal data management software for municipalities. The gathering of these sources resulted in a rich, unprecedented account of the unfolding of the project.

5. THE CIVIL REGISTERS CASE⁸

In the Italian administrative order following World War II, personal data are stored in civil registers of the resident population maintained by municipalities. Municipalities are legally in charge of collecting, updating, storing, and certifying personal data for administrative purposes, and of providing them to other authorities (e.g. tax administration, provinces, police – see note 6) in the pursuing of their administrative tasks. Data provision has traditionally resorted to unicast technologies (e.g. fax, express mail and – in the last 20 years – email). The Ministry of Interior (MoI) – formally owning those data – exercises only supervising, steering, coordinating and supporting functions towards the actions undertaken by municipalities (Ordinamento delle anagrafi della popolazione residente 1954; Approvazione del nuovo regolamento anagrafico della popolazione residente 1989). As Figure 1 shows, the information architecture prescribed by the fundamental law on personal data is therefore highly distributed: individual municipalities act as data providers for the different authorities acting as data users.

This distributed arrangement underwent some changes in 2005, when the Digital Administration Code was issued, forcing cooperation and data sharing between agencies (Codice dell'Amministrazione Digitale 2005). A major program aimed at integrating personal data into the back-office of authorities-as-users was thus planned. This program required setting up a new node at the national level; as a consequence law n. 88 of 2005 introduced the National Index of Civil Registers (NICR, author's translation) (Conversione in legge 2005). NICR was expected to be populated and constantly updated by municipalities, with the goal of pursuing exchange of personal data between local and national authorities. It was to be designed and run by the National Center for Demographic Services (NCDS, author's translation), an operational body – appointed by the MoI – in charge of developing information infrastructures at the national level.

While the NICR constituted a new intermediary in the traditionally unmediated data provision by municipalities to authorities-as-users, the 2005 law was nonetheless compliant with the 1954 law. It delegated the distribution of data (a task not explicitly attributed to municipalities in the original law) to the NICR, and confirmed the role of municipalities as ‘certifiers’: personal data were labelled ‘authentic’ only when certified by municipalities. In other words, NICR was intended to be a nation-wide node with simple aggregating and distributing functions that did not interfere with data content.

By the end of 2005, however, a decree by the MoI specified the technical details for the implementation of NICR: ‘in order to pursue a better execution of ministerial supervising functions’, the decree established that the NICR backbone had to certify the consistency of the exchange process (Indice Nazionale delle Anagrafi 2005, article 6, author’s translation). Therefore, on one hand – following the rule of law – municipalities remained in charge of data certification; on the other hand, the ministerial decree introduced the role of ‘process certifier’, and delegated it to the NICR.

To perform this task, upon request of the MoI a plug-in was placed downstream data-recording in NICR, but upstream with respect to data-transfer to authorities-as-users. The plug-in was meant to verify the formal consistency of data sent by municipalities, and the eligibility of requests from authorities-as-users. When data were transferred by municipalities to the NICR, their information fields had to perfectly match those standardized by the NICR. If one field (e.g. municipality of birth) was empty, or if more fields than those present in NICR were indicated (e.g. family name of husband), data were rejected.

While not being backed by law, such a technical addition was not even explicitly prohibited, and it was meant to comply with the new requirement introduced by the 2005 ministerial decree. Furthermore, its implementation was technologically straightforward.

Lastly, yet importantly, the MoI was one of the funding parties of the project. Because of this conjunction of legal non-impediment, technical feasibility, and economic support, the plug-in could be added to the new information infrastructure.

In the new, interoperable IS data were thus certified twice: while municipalities certified that data matched with an actual status of citizens, the plug-in certified the correspondence between the form of data and the standard established by the Ministry of the Interior, operationalized by the NCDS, and inscribed in the plug-in. However, being located downstream, the plug-in could filter data that had already been certified by municipalities. For this reason, as figure 2 summarizes, in the new system the role of ultimate data certifier *de facto* shifted from municipalities to the national node controlled by MoI/NCDS.

If the technical implications of this addition appeared limited, trans-organizational consequences turned out less trifling. Some municipalities noticed this *de facto* shifting in role. Since they were not prone to lose their role as certifiers, they resisted adopting the NICR backbone for data exchange, thus leading the project into some predicaments. Ultimately, this tension paved the way for another party to enter the arena, acting as mediator between the MoI and municipalities. Actually, some regional governments developed alternative socio-technical solutions to relieve municipalities of the burden of data provision, without for this depriving them of their role as certifiers.

6. DISCUSSION AND ASSESSMENT OF THE VECTORIAL GLANCE

In the case described, a process of IS integration centralized the relationships between government bodies at diverse scales. While with the previous system supported by unicast technologies for data exchange municipalities acted as certifiers in charge of assuring the quality of data, with the new interoperable solution the MoI-controlled plug-in took this role over. Indeed, by delegating the ultimate filtering of information to the plug-in, the MoI became the final certifier in the chain.

In this case, arguing – with iGovernment and Information Society scholarship – that by crossing institutional boundaries information flows empower some government bodies at the expenses of others would not be only reductionist, but also inaccurate. Actually, authorities-as-users were not empowered at the expenses of municipalities in a zero-sum game. Police departments and other users continued to access the same data they accessed before, only in a more centralized and automated way. The true novelty here was the new role of the MoI as ultimate certifier. In other words, the integration of personal registers did not entail a zero-sum redistribution of information, but rather *triggered brand new actors/tasks arrangements*.⁹ With Wyatt (1998, 179), we might say that the new system ‘did not serve to transform the workings of public administration but it was successful in introducing a new player.’

Given this evidence, the civil register case constitutes an ideal field to test the ‘vectorial glance’ being here proposed as a framework to address iGovernment’s main question: how are authority and accountability re-distributed when government IS become interoperable?

On one hand, adopting a performative understanding reveals that the resulting governmental assemblage articulated new boundaries between what was ‘local’ and what was ‘national.’ The process of integration of civil register databases shifted the certifying role from the domain of municipalities to the domain of the MoI. As a result, also the identity of municipalities changed: from institutional actors expected to perform a certain amount of tasks *including* data certification, to institutional actors expected to perform a certain amount of tasks *except* data certification. Of course, *mutatis mutandis* the same may be said of the MoI.

This lens allows us to explain the resistance of municipalities to adopt the new system not in generic terms as the refusal to lose power, as iGovernment and Information

Society approaches would suggest (see Section 2). Rather, saying that the integration of civil registers has re-enacted the national vs. local boundary along a different fault line than it used to be allows connecting resistance to identity issues. Municipalities resisted the new order of relationships that the NICR had brought about. In this new order, the role of certifier of civil registers – a distinctive trait of municipalities' identity – was delegated to the MoI. In other words, municipalities did not refuse to be left aside from information flows that transcended their boundaries; rather, they did resist the way in which those same boundaries – and identities – were re-constituted.

On the other hand, looking into technical decisions that take place at the micro-operative level allows tracing otherwise invisible shifts in institutional relationships. The attribution of the role of data certifier to the MoI happened through the inscription in the plug-in of criteria for data filtering. The introduction of the plug-in not only changed what was considered 'authentic data' (i.e. only information codified according to the formal criteria), but also required municipalities to adopt specific standards established by the MoI. However, the MoI decree introducing the role of 'process certifier' did not mention the plug-in. It is only by focusing on the functioning of the plug-in, and on its downstream placement in the information architecture, that it is possible to notice the centralization of tasks from local to national authorities.

This is the second strength of the vectorial glance: it suggests that invisible shifts in institutional relationships may be nested into operative, micro-technical and low-level decisions, and never – or only long after – acquire a formal recognition in laws or agreements. This evidence suggests that the iGovernment's focus on information flows might not be sufficient to answer its own initial question. It might be only at the operative level of infrastructural technicalities that shifts in institutional authority and accountability become visible. In other words, the vectorial glance suggests that it is by delving into minute

technical details that we have some possibilities to see how boundaries are re-enacted, and thus to trace institutional reordering. Similar technical details are thus strategic sites not only to follow the redistribution of authority and accountability, but also to uncover longer-term micro-evidences of state transformation.

Despite these analytical advantages, the vectorial glance presents nonetheless some limitations. First, scalability can be an issue for an approach that focuses on minute techno-social details. With its emphasis on situatedness, the vectorial glance might cause us to overlook recurrences among diverse case studies, thus hindering a systemic understanding of micro-processes at work in the digital government.

Second, focused as it is on technical micro-processes, users of the vectorial glance might encounter problems in accessing and interpreting data. On one hand, it is undeniable that not all organizations are eager to share technical details of their information infrastructures, especially when the latter are developed by private suppliers, who could invoke trade secrecy to retain technical specifications. On the other hand, interpreting algorithms, code and web services requires multi-disciplinary skills that might be difficult to retrieve among digital government researchers.

7. CONCLUSIONS AND FURTHER APPLICATIONS

By recovering the STS concept of ‘infrastructural inversion,’ this paper has proposed the ‘vectorial glance’ framework as an attempt to integrate the renewed interest for the political implications of interoperable government IS with an attention to the performative consequences of minute technological implementations. While the performative character of IS and the need to delve into technical details might not sound exceptionally novel to an STS-aware readership, their application to the field of interoperable government information infrastructures and state reordering is an under-investigated domain of inquiry. One that promises to be able to address questions posed by a wide range of disciplines.

The definition of interoperability as a process of institutional reordering might prove valuable to throw a fine-grained light on trends devised by those scholars that have addressed institutional change and state transformation from a macro-perspective. To public administration theory, for example, the case study analyzed through the vectorial glance offers evidence of that ICT-induced movement toward centralization described also by Bovens and Zouridis (2002), while it contrasts with the decentralization mantra being repeated for twenty years by New Public Management.¹⁰

The vectorial glance also promises to bring its contribution to the analysis of forms of power emerging from processes of denationalization. As Sassen (2006) has pointed out, capabilities that pave the ground for the new (global) order must still be sought in the national order. It is at the level of nation-state administrations that micro-processes of denationalization take initially place. The civil register case here analyzed has revealed how systems of authentic registers can entail the centralization of certifying functions. This might be considered as one of those invisible capabilities that Sassen sees as ready to ‘jump track’ and constitute the new post-national order.

In this respect, interoperable IS are not only expected to re-enact boundaries along the different scales of government agencies. Even more crucially, they are likely to perform boundaries also between what is ‘government’ and what is not, between what is ‘public’ and what is ‘private.’ For example, to what extent can servers that store cadastral data be considered part of the ‘government assemblage,’ when they are materially based at the data center of a contracted consulting company? In summary, there is the need for the vectorial glance to be deployed along other boundaries than only those internal to government. As iGovernment scholars have pointed out, new public/private hierarchies emerging from integrated information architectures represent a further critical field of investigation.

¹ One rare exception is Wyatt (1998).

² For the purposes of this article, ‘actor’ is defined in its most inclusive and abstract meaning. It refers to either individuals or institutions that are involved in the projects at hand: governmental bodies and agencies at any scale, individual ministers or ministries as organizations, departments, local authorities, and even non-governmental actors, e.g. software developers, private suppliers of ICT services, or citizens. In what follows it will become progressively clear why – using a performative approach – the actual identities of actors can be established only at the end on the analysis, and not *a priori*.

³ De Vries (2008, 124) defines ‘geoICT’ as a specific subset of ICT that ‘allows the study of natural and man-made phenomena with a specific bearing in space’.

⁴ This is the remarkable innovation brought about by those technologies that pursue interoperability at the utmost, i.e. web services.

⁵ As Jasanoff has recalled, the historical strand of STS research in state formation has investigated ‘how knowledge-making is incorporated into practices of state-making, or of governance more broadly, and, in reverse, how practices of governance influence the making and use of knowledge’ (2004, 3).

⁶ While the whole project’s name is mentioned in what follows, for confidentiality reasons the author deems dispensable to provide detailed reference to the specific institutions and people involved. See also notes 7 and 8.

⁷ I.e. various police forces, cadastral offices, public housing agencies, tax offices at different scales, Bank of Italy, chambers of commerce, employment agencies, water bodies, statistical services, multi-utilities, social security and pension agencies, healthcare services, prefectures, provinces, school authorities, vehicle registration authorities, courts, associations of lawyers and notaries.

⁸ This article aims at suggesting an approach useful to address emerging concerns about interoperable information infrastructures redistributing authority and accountability, rather than at deductively providing evidence to some hypotheses. For this reason, the empirical case is treated here as an illustration, and not as a full-fledged study: it should be intended as an exploration of how the adoption of the ‘vectorial glance’ could provide analytical tools to account for the redistribution of authority and accountability. The description of the changing relationships among the many actors involved in the NICR project would indeed take several more pages than those reasonably allowed in a journal paper. This means that – of all the data collected and recalled

above – the following analysis focuses only on one aspect that shows how micro-technical decisions may harbour invisible relocations of institutional roles between the national and the local level.

⁹ On closer inspection, the civil register case constitutes an exemplary illustration of Latour's distinction between intermediaries and mediators. NICR was not simply a discrete intermediary where the output (i.e. data integrated in authorities' back-offices) was a consequence of the input (i.e. municipalities' data flows). Rather, resistance by municipalities revealed that NICR was a full-blown mediator: it triggered new actors/tasks arrangements and ultimately modified the extant order of institutional relations.

¹⁰ Since the 1980s, New Public Management (NPM) has been one of the dominant doctrines in Public Administration Theory. According to Hood, 'the basis of NPM lay in [...] lessening or removing differences between the public and the private sector and shifting the emphasis from process accountability towards a greater element of accountability in terms of results' (1995,94).

REFERENCES

- Agar, J. 2003. *The Government Machine: A Revolutionary History of the Computer*.
Cambridge, MA: MIT Press.
- Agre, P. E. 2004. "Internet Research: For and Against." In *Internet Research Annual. Volume 1: Selected Papers from the Association of Internet Researchers Conferences 2000-2002*, edited by M. Consalvo, N. Baym, J. Hunsinger, K. B. Jensen, J. Logie, M. Murero, and L. R. Shade. New York: Peter Lang.
- Approvazione del nuovo regolamento anagrafico della popolazione residente*. Decree of the President of the Italian Republic n°223 of 30.05.1989, published on G.U. 08.06.1989.
URL: <http://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legge:1989-05-30;223!vig>, accessed November 21, 2014.
- Bartis, E. and N. Mitev. 2008. "A multiple narrative approach to information systems failure: a successful system that failed." *European Journal of Information Systems* 2008(17):112-124. doi: 10.1057/ejis.2008.3
- Baskerville, R., J. Stage, and J. I. DeGross. 2000. *Organizational and Social Perspectives on Information Technology. IFIP TC8 WG8.2 International Working Conference on the Social and Organizational Perspective on Research and Practice in Information Technology June 9–11, 2000, Aalborg, Denmark*. Norwell, MA: Kluwer Academic Publishers.
- Bekkers, V. 2007. "The Governance of Back-office Integration." *Public Management Review* 9(3): 377-400. doi: 10.1080/14719030701425761
- Bloomfield, B. P., R. Coombs, D. J. Cooper, and D. Rea. 1992. "Machines and Manoeuvres: Responsibility Accounting and the Construction of Hospital Information Systems."

Accounting, Management and Information Technologies 2(4): 197-219. doi:
10.1016/0959-8022(92)90009-H

Bloomfield, B. P., and T. Vurdubakis. 1994. "Boundary Disputes: Negotiating the Boundary between the Technical and the Social in the Development of IT Systems."

Information Technology and People 7(1): 9-24. doi: 10.1108/09593849410074007

Bovens, M., and S. Zouridis. 2002. "From Street-Level to System-Level Bureaucracies: How Information and Communication Technology is Transforming Administrative Discretion and Constitutional Control." *Public Administration Review* 62(2): 174-84. doi: 10.1111/0033-3352.00168

Bowker, J. C., and S. L. Star. 1999. *Sorting Things Out: Classification and Its Consequences*. Cambridge, MA: MIT Press.

Butler, J. 1997. *Excitable Speech: A Politics of Performativity*. New York: Routledge.

Carroll, P. 2006. *Science, Culture, and Modern State Formation*. Berkeley: University of California Press.

Castells, M. 1996. *The Rise of the Network Society. The Information Age: Economy, Society, and Culture. Vol. I*. Oxford: Blackwell Publishers.

Codice dell'Amministrazione Digitale. Legislative decree n°82 of 07.03.2005, published on G.U. 16.05.2005. URL: <http://www.camera.it/parlam/leggi/deleghe/05082dl.htm> , accessed November 21, 2014.

Conversione in legge, con modificazioni, del decreto-legge 31 marzo 2005, n. 44 recante disposizioni urgenti in materia di enti locali. Italian parliamentary law n°88 of 31.05.2005, article 1-novies, published on G.U. 31.05.2005. URL: <http://servizidemografici.interno.it/it/content/legge-n-88-del-31052005-0>, accessed November 12, 2014.

- Dawes, S. S. 2009. "Governance in the digital age: A research and action framework for an uncertain future." *Government Information Quarterly* 26(2): 257-64.
- De Vries, W. T. 2008. "A Review of the Political Nature of ICT in G2G Integration - Based on 3 cases from the geoICT Domain." *Proceedings of the 9th Annual International Conference on Digital Government Research, Partnerships for Public Innovation* 289: 124-31.
- De Vries, M. 2012. *Funding of a system of key registers in a psi-economics and contemporary perspective: The Dutch experience in a Danish context*. The Hague - Copenhagen: Danish Ministry for Housing, Urban and Rural Affairs.
- Dunleavy, P., H. Margetts, S. Bastow, and J. Tinkler. 2006. *Digital era governance: IT corporations, the state, and e-government*. Oxford: Oxford University Press.
- European Commission. 2003. "Directive 2003/98/EC of European Parliament and Council of 17 November on the reuse of Public Sector Information." *Official Journal of the European Union*. Available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32003L0098:En:HTML>, accessed November 9, 2014.
- European Commission. 2013. "Directive 2013/37/EU of European Parliament and Council of 26 June amending Directive 2003/98/EC on the re-use of public sector information." *Official Journal of the European Union*. Available at eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:175:0001:0008:EN:PDF, accessed November 9, 2014.
- European Communities. 2004. *European Interoperability Framework for Pan-European eGovernment Services (EIF) Version 1.0*. Luxembourg: Office for Official

Publications of the European Communities. URL:

<http://ec.europa.eu/idabc/en/document/5313/5883.html>, accessed November 9, 2014.

Hanseth, O., E. Monteiro, and M. Hatling. 1996. "Developing information infrastructure:

The tension between standardization and flexibility." *Science, Technology and*

Human Values 21(4): 407-26. doi: 10.1177/016224399602100402

Hanseth, O., E. Jacucci, M. Grisot, and M. Aanestad. 2006. "Reflexive Standardization: Side

Effects and Complexity in Standard Making." *MIS Quarterly* 30(SI): 563-81. DOI:

10.2307/25148773

Heeks, R. 2003. "Most e-Government-for-Development Projects Fail: How Can Risks Be

Reduced?" *Paper No.14, iGovernment Working Paper Series*. Manchester:

University of Manchester, Institute for Development Policy and Management. URL:

[http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPAN015488.p](http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPAN015488.pdf)

[df](http://unpan1.un.org/intradoc/groups/public/documents/NISPAcee/UNPAN015488.pdf), accessed November 9, 2014.

Hellberg, A. S., and A. Grönlund. 2013. "Conflicts in implementing interoperability: Re-

operationalizing basic values." *Government Information Quarterly* 30 (2):154-162.

doi: <http://dx.doi.org/10.1016/j.bbr.2011.03.031>.

Ho, A. T. K. 2002. "Reinventing Local Governments and the e-Government Initiative."

Public Administration Review 62(4): 434-44. doi: 10.1111/0033-3352.00197

Hood, C. 1995. "The 'new public management' in the 1980s: Variations on a theme."

Accounting, Organizations and Society 20(2-3): 93-109.

Indice Nazionale delle Anagrafi (INA): il regolamento di gestione. Decree of the Italian

Ministry of Interior n°240 of 13.10.2005, published on G.U. 23.11.2005. URL:

<http://www.altalex.com/index.php?idnot=10108>, accessed November 12, 2014.

- Jasanoff, S. 2004. "The Idiom of Co-Production." In *States of Knowledge: The Co-Production of Science and Social Order*, edited by S. Jasanoff, 1-12. New York: Routledge.
- Kallinikos, J. 2004. "Deconstructing information packages: Organizational and behavioural implications of ERP systems." *Information Technology and People* 17(1): 8-30.
- Kling, R. 1991. "Computerization and Social Transformations." *Science, Technology & Human Values* 16(3):342-367.
- Latour, B. 1992. "Where are the Missing Masses? The Sociology of Few Mundane Artefacts." In *Shaping Technology / Building Society: Studies in Sociotechnical Change*, edited by W. E. Bijker and J. Law, 225-258. Cambridge, MA: MIT Press.
- Latour, B. 2005. *Reassembling the Social. An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.
- Mayer-Schönberger, V., and D. Lazer. 2007. "From Electronic Government to Information Government." In *Governance and Information Technology: From Electronic Government to Information Government*, edited by V. Mayer-Schönberger and D. Lazer, 1-14 . Cambridge, MA: MIT Press.
- Mitchell, T. 1991. "The Limits of the State: Beyond Statist Approaches and their Critics." *American Political Science Review* 85(1): 77-96.
- Mukerji, C. 2011. "Jurisdiction, Inscription, and State Formation: Administrative Modernism and Knowledge Regimes." *Theory and Society* 40(3): 223-45. doi: 10.1007/s11186-011-9141-9
- Nograšek, J., and M. Vintar. 2014. "E-government and Organisational Transformation of Government: Black Box Revisited?" *Government Information Quarterly* 31(1): 108-18. doi: <http://dx.doi.org/10.1016/j.giq.2013.07.006>

- OECD [Organization for Economic Co-operation and Development]. 1998. "Information Technology as an Instrument of Public Management Reform: A study of Five OECD countries." *OECD Working Paper No. 99*. OECD Publishing. URL: <http://search.oecd.org/officialdocuments/displaydocumentpdf/?doclanguage=en&cote=PUMA%2898%2914>, accessed November 9, 2014.
- OECD. 2003. *The e-Government Imperative*. OECD Publishing. doi: 10.1787/19901054-en
- OECD. 2009. *Rethinking e-Government Services: User-Centred Approaches*. OECD Publishing. doi: 10.1787/9789264059412-en
- OECD. 2011. "Communiqué on Principles for Internet Policy-Making." *Brochure on OECD High Level Meeting – The Internet Economy: Generating Innovation and Growth*. URL: <http://www.oecd.org/internet/innovation/48289796.pdf>, accessed November 9, 2014.
- Ordinamento delle anagrafi della popolazione residente*. Italian parliamentary law n°1228(1) of 24.12.1954, published on G.U. 12.01.1955. URL: <http://www.asgi.it/wp-content/uploads/public/legge.24.dicembre.1954.n.1228.pdf>, accessed November 12, 2014.
- Orlikowski, W.J. 2000. "Using Technologies and Constituting Structures: A Practice Lens for Studying Technology in Organizations." *Organization Science* 11(4): 404-28. doi: <http://dx.doi.org/10.1287/orsc.11.4.404.14600>
- Orlikowski, W. J., and D. Robey. 1991. "Information Technology and the Structuring of Organizations." *ISs Research* 2(2): 143-69.
- Orlikowski, W. J., G. Walsham, M. R. Jones, and J. I. DeGross (editors). 1996. *Information Technology and Changes in Organizational Work*. London: Chapman and Hall.

- Oudshoorn, N. E. J. 2011. *Telecare Technologies and the Transformation of Healthcare*. Basingstoke: Palgrave Macmillan.
- Pelizza, A. and Hoppe, R. 2015. "Birth of a Failure: Consequences of framing ICT projects as failures for the centralization of inter-departmental relations." *Administration and Society* 47(X): 123-456. doi VVV:
- Prins, J. E. J., D. Broeders, H. M. Griffioen, A. G. Keizer, and E. Keymolen. 2011. *iGovernment*. Amsterdam: Amsterdam University Press.
- Prins, J. E. J., D. Broeders, and H. M. Griffioen. 2012. "iGovernment: A New Perspective on the Future of Government Digitisation." *Computer Law and Security Review* 28(3): 273-82. doi:10.1016/j.clsr.2012.03.010
- Sahay, S., M. Aanestad, and E. Monteiro. 2009. "Configurable Politics and Asymmetric Integration: Health e-Infrastructures in India." *Journal of the Association for Information Systems* 10(SI): 399-414. URL: <http://aisel.aisnet.org/jais/vol10/iss5/4>, accessed November 8, 2014.
- Sassen, S. 2006. *Territory, Authority, Rights: from Medieval to Global Assemblages*. Princeton: Princeton University Press.
- Star, S. L. and Ruhleder, K. 1996. "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces." *Information Systems Research* 7(1):111-34. doi.org/10.1287/isre.7.1.111
- Van Dijk, J. 2012. *The Networked Society*. London: Sage.
- Walsham, G. 1993. *Interpreting ISs in Organizations*. Chichester: John Wiley.
- Walsham, G., and Sahay, S. 1996. "GIS for District-Level Administration in India: Problems and Opportunities." *MIS Quarterly* 23(1): 39-65. doi: 10.2307/249409

- Waterton, C. 2010. "Experimenting with the Archive: STS-ers As Analysts and Co-constructors of Databases and Other Archival Forms." *Science, Technology, and Human Values* 35(5): 645-676.
- Wyatt, S. 1998. *Technology's Arrow. Developing Information Networks for Public Administration in Britain and the United States*. PhD Thesis, University of Maastricht.
- Wyatt, S. 2003. "Non-Users Also Matter: The Construction of Users and Non-Users of the Internet." In *How Users Matter: the Co-Construction of Users and Technology*, edited by N. Oudshoorn and T. J. Pinch, 67-79. Cambridge, MA: MIT Press.
- United Nations. 2010. *E-Government Survey 2010: Leveraging eGovernment at a time of financial and economic crisis*. New York: United Nations. URL: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan038851.pdf>, accessed November 12, 2014.
- United Nations. 2012. *E-Government Survey 2012: E-Government for the people*. New York: United Nations. URL: <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf>, accessed November 12, 2014.
- US Federal Chief Information Officer. 2012. *Digital Government: Building a 21st Century Platform to Better Serve the American People*. Washington, DC: Whitehouse. URL: <http://www.whitehouse.gov/sites/default/files/omb/egov/digital-government/digital-government.html>, accessed November 12, 2014.

FIGURES

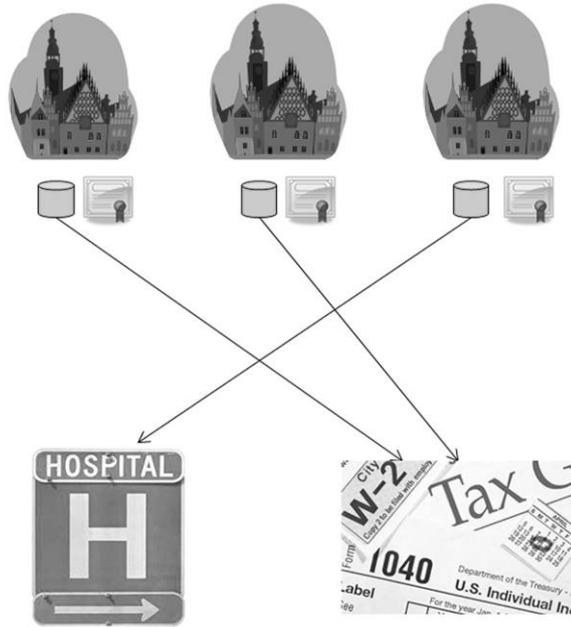


Figure 1: Previous system: municipalities as certifiers

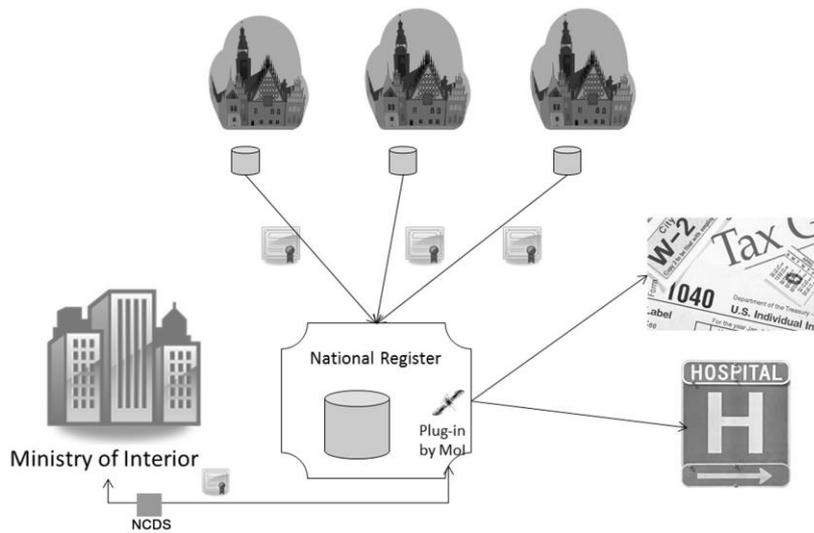


Figure 2: Interoperable system: MoI as certifier