ORGANISATIONAL IMPACTS OF INFORMATION SYSTEMS: THE CASE OF SWISS CIVIL REGISTERS

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Abstract

This paper examines the revolution that has occurred in the management of population registers in Switzerland over the last decade, with the introduction of electronic databases replacing paper-based registers, and due to a process of harmonisation to foster data-exchange. Focusing on civil registration, which has long operated with rules laid down two centuries ago, we have developed a model to assess the organisational impacts of this major development on Swiss public administration, especially in terms of centralisation.

Keywords: civil registration, information technology, centralisation, public management

INTRODUCTION

Population registers are currently used to provide reliable information for traditional state functions such as taxation, budgeting and military service, but also to establish the eligibility of individuals for voting, education, health and social insurance schemes. Recent developments towards digitising government record-keeping have challenged policies established at a time when data was kept in paper registers, notably in terms of record management. More generally, the computerisation of public administrations has led to what some call a "system-level bureaucracy" (Bovens and Zouridis 2002). This evolution may impact on processes like centralisation (e.g. of decision-making) and decentralisation (e.g. territorial). So far, however, most studies have been carried out in the private sector and little attention has been paid to the specificities of public administration. The aim of this paper is to lay the groundwork for this task.

In order to better understand the influence of Information Technologies (IT) on the centralisation of Swiss administrations (at the federal, cantonal and municipal levels) we have developed a two-dimensional model with each dimension measured by four indicators. For the centralisation dimension, the indicators relate to the location of the *decision-making*, the distribution of *competence* and *financing* between the different levels of Swiss administration, and the *infrastructures.* The IT dimension will be assessed considering *technology as artefact* or technology in itself, the *use of technology* with the interactions between humans and technology, the *structuring aspect of technology* with all the rules imposed by the system to its users, and the *communication and data exchange.*

This paper is organised in the following way. It first gives a brief overview of the organisation of the Swiss government. It then goes on to the civil status registers and other population registers involved in a process of harmonisation aiming to simplify statistical data-collection and data-exchange. The third part lays out the theoretical dimensions of the research and the model we have developed from these theories. The research method and some preliminary results are described in a fourth section. Finally we draw some concluding remarks.

SWISS POLITICS: SPECIFICITIES[1]

To better understand the implications of these recent changes in the management of population registers, a small detour introducing the Swiss political context is necessary.

Switzerland, also known by its official name of "Swiss Confederation", is a federal republic with three main linguistic regions (German, French and Italian). The country is divided into 26 cantons, which have a high degree of independence with their own constitutions, their governments, their parliaments and their laws (cantonal laws must be compatible with the federal ones). If some areas, such as foreign policy, are in the hands of the central government, the cantons have their own police, decide their level of taxation, and control their education systems and social services.

The communes form the third level of the federal state, fragmenting the country into more than 2500 political entities[2] varying greatly in area and population. About half contain less than 1000 inhabitants, Corippo being the smallest with 15 people. On the other side of the spectrum, the municipality of Zürich has a population of more than 365'000 inhabitants.[3] In addition to the tasks assigned to them by the cantons and the Confederation, the communes manage their own budget, make their own political policy and decisions, and fulfil their own responsibilities in areas such as schools, social services, public utilities and taxes. They also register life events, such as births, marriages and deaths, with the Swiss citizenship deriving from the commune where the citizen comes from. As the cantons are to a large extent in charge of organising and guaranteeing the autonomy of the communes, the responsibilities and degree of autonomy of the communes differ widely from one to another.

Since the beginning of year 2000, there is an increasing tendency to merge small communes, as many of them are having difficulties to perform their required duties. This development is in general supported by the cantonal governments and has led to the disappearance of 348 communes over the last ten years,[4] which is more than throughout the whole twentieth century (Office Fédéral de la Statistique 2006). Without going so far as a merger, many

[1] www.swissworld.org/en/politics
[2] 2551 municipalities as of January 2011, www.portal-stat.admin.ch/gde-tool/core/xshared/gewo.php
[3] www.bfs.admin.ch/bfs/portal/fr/index/themen/01/02/blank/key/raeumliche_verteilung/kantone__gemeinden.Document.67224.xls, as of December 2009
[4] www.portal-stat.admin.ch/gde-tool/core/xshared/gewo.php

municipalities are tightly cooperating through the creation of special-purpose districts, of which the civil registration districts provide one example.

CIVIL REGISTRATION AND OTHER POPULATION REGISTERS

The administration of public activities has always required some form of registration, even as early as during the Chinese and Roman empires. To be able to identify the population was important for various reasons, such as taxation, budgeting and military service. After the Middle Ages, the registration of births, weddings and deaths used to take place in parish registers, and it was not until the nineteenth century that many countries handed over the responsibility to register life events from the clergy to public servants.

The increasing use of Information and Communication Technologies (ICT) has reconfigured the way governments manage their population registries. In the field of civil registration, little change occurred in Switzerland between a law establishing civil registration districts in 1876 and the beginning of the twenty-first century. However, in January 2005, the Federal Department of Justice and Police provided cantons with a computerised civil status register called Infostar to which all civil registration offices must be connected. These cantonal offices dropped drastically in number since the introduction of Infostar; from 1750 offices in 2004 to 167 at the beginning of 2011.[5]

The centralised database Infostar is one of the key registers to implement the "Federal Act on the Harmonisation of the Register of Residents and of other Official Registers of Persons"[6] approved by Parliament in 2006. Primarily maintained by the cantons and operated by the Federal Office of Justice, it became fully managed by the Confederation in 2010, in response to a request by the cantons. More than 2500 registers of residents are also kept by Swiss municipalities in order to monitor the people living on their territory. Together with the federal databases for migrants, diplomats, Swiss citizens living abroad and basic social insurances (disability, old-age and survivors), these registers are at the core of the harmonisation process, which aims to simplify data-collection and foster data-exchange between those registers.

Figure 1 illustrates data flows between registries following a birth, which involves registration at the three administrative levels described above. The first

[5] www.bj.admin.ch/bj/fr/home/themen/gesellschaft/zivilstand.html
[6] www.admin.ch/ch/e/rs/4/431.02.en.pdf

notification, usually made by the hospital, informs the civil registration district of a new-born (1). The data is entered into the computerised database (Infostar), and then forwarded by mail to the commune (which maintains a resident register, 2a) and electronically to the Central Compensation Office (CdC, 2b) which runs a Unique Personal Identifier database (UPI). The third notification transmits this thirteen-digit identifier[7] to Infostar (3), which, in a final step, forwards it to the resident register (4). This last electronic notification usually comes earlier than the postal notification, but the situation could change as there is currently a project called eMISTAR (e-messages Infostar) to replace the paper notifications of births by a system of electronic reporting.[8]

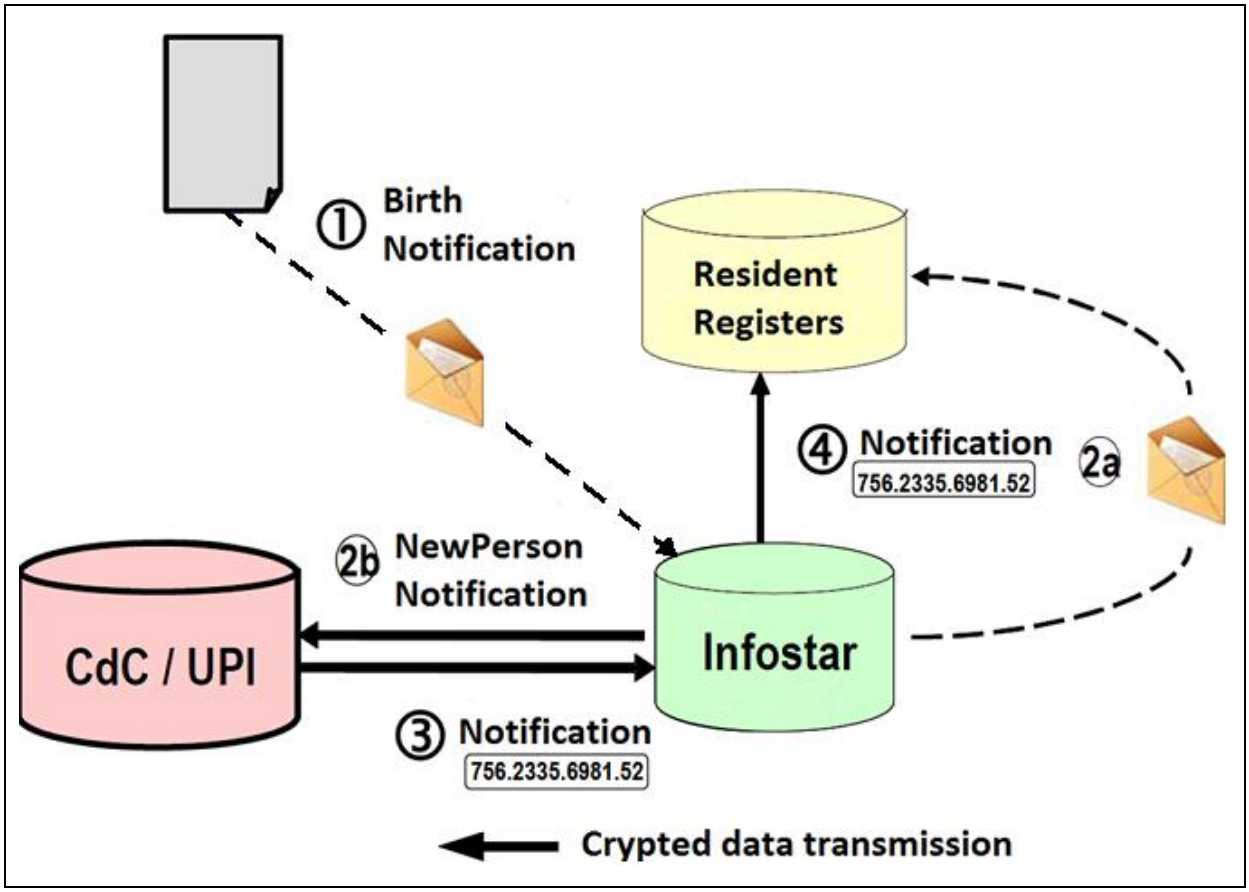

Figure 1: Birth notification process
Source: Office Fédéral de la Statistique (2005b)

[7] This unique identifier is central to the harmonisation of Swiss registries. It was introduced in 2006 within a new law related to the old-age and survivors' insurance (OASI). The OASI is the main Swiss social security insurance, which provides pensions for retired persons, widows/widowers and orphans. It covers all individuals who live or are gainfully employed in Switzerland, and is compulsory for foreign nationals too.
[8] www.bj.admin.ch/content/bj/fr/home/themen/gesellschaft/zivilstand/einwohnerkontrolle.html

This project to harmonise registers is part of a broader e-government strategy adopted by Switzerland in 2007, whose goal is "to enable both businesses and the population to carry out important transactions with the authorities electronically. The authorities in turn are called upon to modernise their business processes and to communicate electronically with each other."[9]

MODELLING INFORMATION TECHNOLOGY AND CENTRALISATION

Several theories have been used to study the relationship between Information Systems (IS) and organisational change. A special issue of *The Journal of Applied Behavioral Science* summarised the state of the art on this matter a few years ago (Barrett et al. 2006). The past thirty years have seen a progressive shift from a technological determinism perspective, treating technology as a physical entity which determines organisational outcomes (Smith and Marx 1994), towards a position considering technologies as dependent of a specific sociocultural context (MacKenzie and Wajcman 1999). Several scholars have attempted to go beyond the view of technology as either a material cause of change or the product of a specific context (as for instance Orlikowski and Barley 2001). Rather than opting for one of these two postures, we chose an intermediary stand which takes into account both the technological and the organisational imperatives, as proposed by Markus and Robey in their seminal article (Markus and Robey 1988).

Information Technology

Theoretical foundations - The first dimension of our model is based on two main theories: the structuration theory primarily proposed by Giddens (1984) and then adapted to study the link between technology and social structures, and the Technology Acceptance Model (Ajzen and Fishbein 1980).

For Giddens, a sociologist who developed his theory in the 1980's, all human action is performed within the context of a pre-existing social structure influencing it, and at the same time that human action contributes to the creation of those structures. Thus, human action (what he also calls agency) can lead to both the reproduction and the transformation of society (Giddens 1984).

[9] www.egovernment.ch/en/grundlagen/strategie.php

Over the last twenty years, many scholars have applied this theory to the IS field, generating a considerable amount of literature (Jones and Karsten 2008). We will rely in particular on the work of Orlikowski who has adapted Giddens' duality of structure to technology, explaining that technology is created and changed by human action, but also influences human action (Orlikowski 1992). She also distinguishes *technology as artefact* ("the bundle of material and symbol properties packaged in some socially recognizable form, e.g., hardware, software, techniques"), from *technology in use,* which is "what people actually do with the technological artefact in their recurrent, situated practices" (Orlikowski 2000). In the same line of thinking, Fountain differentiates what she calls *objective technologies* and *enacted technologies* (Fountain 2001).

While Giddens is widely quoted in literature connecting organisation studies and information systems, other approaches received particular attention from scholars. Among them, the theory of reasoned action (Ajzen and Fishbein 1980) served as a basis to the Technology Acceptance Model (TAM) developed by Davis in the late 1980's. This theory, which constitutes the second theoretical basis of our model, suggests that users consider several factors to decide how and when they will accept to use a new technology. The two main factors of decision described by Davis is *perceived usefulness*, defined as "the degree to which a person believes that using a particular system would enhance his or her job performance", and *perceived ease-of-use* which refers to "the degree to which a person believes that using a particular system would be free from effort" (Davis 1989).

IT indicators - The first indicator to analyse the IT dimension is *technology as artefact,* which represents the technology as such with its full potential. Following Orlikowski's distinction presented above, we then take into account the *use of technology,* which emphasises the relationships between the human agents and the (socially embedded) technology. The specific rules that IT impose on users to determine their level of freedom, establish processes related to identity management and data-protection, and to promote standards, are described as the *structuring aspect of technology*. Although it may lead to some confusion with the theory of structuration, we have not yet found a better way to label this indicator yet. *Communication and data-exchange*, which is related to the development of IT infrastructures, constitutes our last indicator. If

communication technologies are often aggregated with information technologies to form the Information and Communication Technologies (ICT), Bloom et al. have warned against the danger of this aggregation. In their research, they associate communication with centralisation (as falls in communication costs will tend to reduce employee autonomy), and information to decentralisation (as falls in information acquisition costs will facilitate more effective employee decision-making) (Bloom et al 2009).

Centralisation

Theoretical foundations - While the impact of Information Systems on organisations has been studied by an increasing number of scholars over the past decades, it has remained somewhat neglected by public administration scholars, except for a minority of them specialised in e-government and e-governance (Pollitt 2010). Furthermore, the literature within this field has generated contradictory findings. One of the issues is that technologies and organisations each embed elements of the other, blurring the distinction between them. Introduced to different social contexts, a given technology can have very different results, the same way that a social context can be noticeably changed by the introduction of a new technology. Thus "students looking for the big theory that fits all circumstances (...) will be disappointed by this contextuality" (Pollitt 2010).

As regard the centralisation dimension that interests us most, the studies conducted since the 1970's fail to identify a clear trend. In their literature survey, George and King (1991) noticed conflicting explanations on the relationship between IT and centralisation. For some studies the introduction of Information Systems leads to a centralisation of decision-making authority through the increased capabilities of IT to monitor and control the members of an organisation. In contrast, another stream in the literature observes a phenomenon of decentralisation explained by the possibility to delegate complex computing operations to IT, whereas people were before dependent upon their hierarchy.

This difficulty to bring out a general trend connecting centralisation and IT has led to more circumstantial descriptions of the relationship. Some authors have emphasised the temporal aspect, with successive phases of centralisation

and decentralisation (Evaristo et al. 2005). For other scholars, the degree of centralisation varies according to the type of IT under consideration. Thus, organisational IT as a large database system diminishes user autonomy, while personal IT, which can be tailored by individuals (PDAs, small database management systems), fosters a decentralisation process (Meijer and Homburg, 2003). In any case, as explained by Peled (2001), depending on the theoretical background and the research techniques employed, scholars will ask different questions which are likely to entail different findings and interpretations. It is therefore necessary "that scholars display humility while researching the impact of new computing technologies on organizations" (Peled 2001).

We use four indicators in order to measure to what extent the IT tools introduced in the management of population registers impact the degree of centralisation of Swiss public administrations. The following section describes these different variables in more detail.

Indicators of Centralisation - The first indicator used to measure the degree of centralisation is the *decision-making authority*. In a democratic State, this authority should lie in the hands of elected politicians. Thirty years ago, Lipsky argued that street-level bureaucrats have a substantial discretionary authority in executing their jobs (Lipsky 1980). With the increasing use of IT over the last decades, some scholars argue that this discretionary power has progressively slipped from street-level through screen-level to system-level bureaucracy, system analysts and software designers being the key actors of this new configuration (Bovens and Zouridis 2002). A second indicator of centralisation is *competence*, and in particular its distribution between the Confederation, the cantons and the communes. Given the federal structure of Switzerland, this distribution is the subject of recurring debates (Horber-Papazian and Soguel 1996). The registration of life events is usually a cantonal competence, but in the canton of Geneva the municipalities are in charge of it. Money being the sinews of war, *financing* is another important indicator which is closely linked to competence. If the development and management of Infostar has been transferred in 2010 to the Confederation, the distribution of financial charges and revenues is still under discussion[10]. *Infrastructure*s are another key indicator,

[10] In 2002, a few months after a modification of the Swiss Civil Code related to Infostar, its funding has been debated in the National Council. www.parlament.ch/F/Suche/Pages/geschaefte.aspx?gesch_id=20021038

with significant developments related to the computerisation of population registers having taken place in recent years, both at the federal level (with Infostar or sedex[11]) and at the cantonal level.
The table 1 summarises these indicators for IT and centralisation.

Table 1: IT and Centralisation indicators

INFORMATION TECHNOLOGY	CENTRALISATION
Technology as artefact	Decision making authority
Use of technology	Competence
Structuring aspect of technology	Financing
Communication and data exchange	Infrastructures

RESEARCH METHODOLOGY AND PRELIMINARY RESULTS

Besides a literature review based on academic publications in the field of public administration, information systems and organisation studies, we have also undertaken a document analysis on publications of offices related to population registers (in particular the Federal Civil Status Office and the Federal Statistical Office). Moreover we have collected data through semi-structured interviews. This form of data-collection was chosen because, although based on an interview guide, it is flexible enough to allow for the emergence of new elements from the discussion. Addressing each of the eight indicators of our model, the number of questions varied slightly depending on the type of stakeholder (for instance, we did not ask politicians or IT specialists questions related to the use of Infostar).

The stakeholders we met were involved in three different areas of activity (civil registration, information technology and politics), and at the three different levels of Swiss public administration (federal, cantonal and communal). To have a representative sample of the country, we selected six cantons (two in the French-speaking part, two in the German-speaking part and two bilingual cantons). In each canton, two communes were chosen, one hosting a civil registration district, and one having lost its civil registration office with the profound changes that occurred in the last decade. At the end of our research, the aim is to have

[11] Stands for secure data exchange, an IT platform launched in 2008 to facilitate the exchange of data between federal, cantonal and local population registers.

conducted about 40 interviews. We have to date conducted 20 interviews with all kinds of stakeholders and at all administrative levels, but mainly in the French-speaking part of Switzerland. We also have some contacts with data protection officers[12] and private IT companies having close relationships with public administration. On average, the interviews have lasted ninety minutes and have been conducted at the place of work of the interviewees. On some occasions, collaborators that were not solicited joined the meeting, indicating that they are interested in the topic.

Preliminary results

Our analysis period covers the last ten years, from the early 2000's to today. During this period, technical and legal evolutions have led to a massive computerisation of population registers. At the same time, there has also been an acceleration in the number of commune-mergers.

Our first set of interviews allowed us to test our model and highlighted some trends. The first significant element to emerge relates to the causes of the reduction of civil registration offices. Since the commissioning in January 2005 of Infostar, the Swiss computerised civil status registry, there was a centralisation of infrastructures with the number of civil registration districts divided by ten (from 1750[13] to 167[14]). As the introduction of Infostar coincided with the entry into force of new legislation on civil status,[15] it is unclear whether this drastic reduction is due to the computerisation of record-keeping or to the professionalisation required by the new law (which imposes an activity rate of at least 40% for registration officers). Actually, both reasons were given during our interviews, depending on the type of stakeholder being interviewed. One registration officer explained that due to the increasing complexity of the civil registration field, the introduction of Infostar was inevitable and led to the disappearance of numerous offices. On the contrary, the former project manager of Infostar at the Federal Office of Civil Status stressed that other scenarios were proposed to computerise civil registers without reducing the number of offices.

[12] since a few years, almost all cantons have their own data protection officer who is often also in charge of ensuring the respect of the principle of transparency

[13] www.ejpd.admin.ch/ejpd/fr/home/dokumentation/mi/2003/ref_2003-05_01.html

[14] As of March 2011, www.bj.admin.ch/content/dam/data/gesellschaft/eazw/support/zivilstandskreise.xls

[15] www.admin.ch/ch/f/rs/c211_112_2.html

For him, "*it was argued that Infostar was too complicated for small offices. In fact this argument has been used as a pretext to justify the reduction of the number of registration offices*". Whatever the reason, this was a real revolution in this domain unaccustomed to change. "*We went directly from the nineteenth century to the twenty-first century, bypassing the twentieth century*", said another registration officer. The previous revolution dates back to 1876 with the transfer of competence in the registration of life events from the Church to the secular authorities.

We also gathered many comments related to the governance of data, the transition from remote paper-based registers to interconnected electronic registers having a significant impact on aspects like reliability, availability, security, confidentiality, completeness and update of data. If from a technical point of view there is no particular issue in granting access to comprehensive datasets of population registers, issues like data protection limit their access. With the pervasive use of IT in public administration, data protection has become a central issue with the Federal Law on Data Protection, revised in 2008. During our interviews, both IT managers and registration officers considered the measures to respect the privacy of citizens in population registers to be sufficient, even if the harmonisation of the registers contains some risks. This also explains the need to be careful, expressed by a member of the Council of States[16], who submitted a parliamentary intervention about the prospective use of Infostar by the resident registers.[17] During our interview, he explained that one of his main concerns was related to data protection.

The distinction between the technology as artefact and the use of technology has also emerged from the interviews. One registration officer explained that within their own cantons, the different offices do not use Infostar identically. "*This mainly concerns details, as 95% of the work is done in the same way, but we note small differences especially with the trainees moving from one office to the other*". The differences in the use of Infostar could even be more important between cantons, as they might have different repartitions of competence with their communes.[18] This relative flexibility contrasts with the

[16] the Council of States has 46 members and represent the cantons at the federal level. Together with the National Council, made up of 200 members and representing the Swiss people, they form the Federal Assembly

[17] www.parlament.ch/F/Suche/Pages/geschaefte.aspx?gesch_id=20103090

[18] We already mentioned the canton of Geneva, where the civil registration is a local competency, while the registration of resident is centralized at the cantonal level. In other cantons this is usually the other way round.

limitations experienced by users, the system prohibiting some uses. For example, in one case reported, a civil servant could not add the maiden name in a specific field, even if it made sense in this particular case. This supports the idea of a shift towards a system-level bureaucracy as described by Bovens and Zouridis (2002).

CONCLUSION

This paper's main objective was to determine the effect of the use of IT in the organisation of public administration by analysing the case of population registers, in particular the Swiss computerised civil status register. Given the embeddedness between technology and organisations, we have developed a model to apprehend this reality. The construction of this model and its relevance to our field of study form the core of this paper. We also discuss preliminary results that show that our model is relevant to analyse IT and organisations (or at least that did not show major flaws in it).

Further work needs to be done to establish whether and to which extent our model requires some improvement. This could contribute to enhance our understanding of technological change which, as Pollitt argues, "has an enormous influence on public management (...) [and] deserves a more central position in our studies" (Pollitt 2010).

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