

Research Article

Interplay of Institutional Logics and Implications for Deinstitutionalization: Case Study of HMIS Implementation in Tajikistan

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Abstract

This article describes the efforts to reform the Health Management Information System (HMIS) of Tajikistan. The authors were involved in proposing and piloting a computerized HMIS based on a complete overhaul of the current data collection tools, as well as in planning for the scaling up of the system. One of the recommendations was to support local decision-making through a flexible, decentralized system to collect, process, and analyze essential primary healthcare data. The institutional logics underlying the current HMIS in Tajikistan were heavily influenced by the tenets of central planning from a deeply embedded Soviet system that was alien to the ideas proposed. This article explores the different institutional logics arising from what already existed and from our proposals, as well as the interplay among them over the course of the project. Clearly, a complete deinstitutionalization—amounting to a paradigm shift—is necessary to overcome the differences in institutional logics. However, this is a remarkable challenge, given a centralized control context. This study makes interesting contributions to the domain of IS/HMIS research in two ways: (a) by reporting from a country that until now has been almost invisible to the IS community, and (b) by adding to the debate around IS and organizational change through the lens of institutional logics and deinstitutionalization.

1. Introduction

Tajikistan is a Central Asian country about which little, if anything, has been published in the mainstream information systems (IS) and development communities. Gaining independence after the downfall of the Soviet Union in 1991, Tajikistan has experienced an extremely rocky period, with a prolonged civil war and the loss of the supporting Soviet financial and social infrastructure. The country faces further challenges that include an extreme climate, a long and porous border with war-ravaged Afghanistan, a recent food and energy crisis of gargantuan proportion (Antelava, 2008), and the exodus of many trained people due to weak employment and decreasing social opportunities at home.

As do other Central Asian countries, Tajikistan confronts urgent public health problems. The demise of the Soviet economic base, followed by civil war, has led to a surge in various communicable diseases in the last two decades. According to the World Health Organization, life expectancy

has decreased through poor nutrition, polluted water, and increased incidence of diseases (WHO, 2008).

Acknowledging the key role that ICTs can play in development and public health management, the Asian Development Bank (ADB) established the Health Sector Reform Project (HSRP) in 2005, with the aim of creating various reform initiatives, including those relating to Health Management Information Systems (HMIS). One of the four authors of this article was invited by the ADB to participate in the HMIS-related reform efforts. He enrolled the three other authors to create a joint team responsible for the design, development, and pilot implementation of the national HMIS. However, carrying out these tasks was fraught with immense challenges, most of which were related to countering the policies of the existing institutions left behind by the Soviet legacy, which favored a large manual system based on a centralized planning model. The research team's key efforts revolved around understanding and addressing these historical conditions and trying to create new institutions that were based on a computer-based HMIS and favored local analysis and use of information. These efforts resulted in two key research questions:

- What are the key institutions that challenge the introduction of ICT-based HMIS reforms in the context of a post-Soviet economy?
- What theoretical concepts inspired by institutional theory could help us to understand deeply the nature of these challenges, and how may these be addressed?

The remainder of the article is organized as follows: In section 2, we propose key theoretical concepts from institutional theory that help to develop our analysis; section 3 provides a brief summary of the research methods used; section 4 discusses the details of the case study; and section 5 presents the case analysis, based on institutional theory. That is followed by a concluding section on discussions and contributions.

2. Theoretical Perspective: Institutional Logics and Deinstitutionalization

The theoretical aim of the article is to develop concepts that can identify existing institutions that

shape the deployment of computer-based HMIS and their associated processes. The concepts of institutional logics and deinstitutionalization provide a framework for this by helping us to categorize actions and artifacts as belonging to underlying themes that represent the various forces in play, as well as to analyze the interplay among them. First, though, we present an overview of institutions and institutional theory, as applied to the information systems field.

The basic building block of institutional theory is the concept of *institutions*, which has been diversely defined within the domains of economics, political science, and sociology. For example, economic historian Douglas North defines institutions as human-devised rules in a society that shape human interactions, or the "rules of the game" (1990, p. 3). While formal rules include political rules, economic rules, and contracts, informal rules include taboos, customs, and traditions (Jepperson, 1991). Both formal and informal institutions help to give pattern to human or organizational behavior by enabling and constraining their activities.

In the context of sociology of organizational studies, the definition of institution has been expanded by DiMaggio and Powell to include the unintentional activities of human beings, an aspect not covered in the definition of North. "While institutions are certainly the result of human activity, they are not necessarily the products of conscious design" (1991, p. 8). From a sociological perspective, Jepperson elaborates on institutions as follows:

[I]nstitution represents a social order or pattern that has attained a certain state or property; institutionalization denotes the process of such attainment. . . . [O]rder or pattern . . . is conventional to standardized interaction sequences. . . . [W]hen departures from the pattern are counteracted in a regulated fashion, we refer to a pattern as institutionalized. (1991, p. 145)

In trying to reconcile the multiplicity of definitions given by various researchers, Scott defines institutions "as multifaceted, durable social structures, made up of symbolic elements, social activities, and material resources" (2001, p. 49). In a subsequent publication, Scott elaborates on the distinctive properties of institutions, as they are resistant to change and tend to be transmitted across generations through different mechanisms, by argu-

ing that “institutions are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life” (2008, p. 48). This article draws from Scott’s definition, further articulating how conflicting institutional logics erode what are seemingly stable institutions and contribute to the creation of new ones.

Institutional Theory in IS

In IS research, an increasing number of studies have adopted an institutional perspective to examine processes of IT development, implementation, and use, with a focus on institutional influences on technological changes (Orlikowski & Barley, 2001). For example, an early study by Kling and Iacono (1989) shows how a computer-based IS with stable structures was difficult to change. However, Fountain (2001) criticizes IS studies for ignoring the role of IT in shaping existing institutions, and for not acknowledging the reciprocal effects between institutions and technology. In a similar vein, Avgerou (2002) argues that IT, on its own, can be considered as an institution that can be seen to account adequately for the processes of transformation of organized activities in a society. From the perspective of HMIS, Noir and Walsham (2007), drawing on empirical material from the Indian healthcare sector, describe the ceremonial roles that “ICT for development” plays in legitimizing development initiatives. Similarly, based on their work in Ethiopia, Mekonnen and Sahay (2009) discuss how the institutional context mediates the processes of standardizing and of scaling of health information systems. Though most IS studies have adopted the theory to understand stability of institutions and resistance to change, they have given limited attention to how institutions change or erode away—in short, to how processes of deinstitutionalization take place (Oliver, 1992). Our study contributes to this debate through the analysis of contradictory institutional logics that lead to the process of deinstitutionalization.

Institutional Logics

The concept of institutional logics was initially introduced by Alford and Friedland (1985) to describe contradictory social practices, though it was subsequently expanded by others (e.g., Thornton & Ocasio, 1999, 2008; Scott, Ruef, Mendel, & Caronna, 2000). For example, Thornton and Ocasio define institutional logic as “the socially constructed,

historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality” (1999, p. 804). These logics inscribe the “organizing principles” that supply practice guidelines to field participants, guiding both the means and ends of individual behavior (Friedland & Alford, 1991). Institutional actors, then, can be viewed as agents and carriers for producing and reproducing the logic within a specific institutional environment (Scott et al., 2000).

Institutional logics work at different levels, both within institutions, such as health services, and between institutions, such as the various professions engaged within health services. In addition, actors are part of other institutions that are apart from, though not independent of the institution in question. For example, religion, marriage, cultural, and ethnic boundaries carry their own logics to govern behavior (North, 1990; Ingram & Klay, 2000), and people engaged in the health sector also operate within the boundaries of these institutions. Decisions are thus not only based on individual agency, but are greatly formed by the institutions in which actors operate, and from which they draw legitimacy and identification (Jackall, 1988; Friedland & Alford, 1991).

Institutional logics are never homogeneous; within an organization, multiple logics may be simultaneously in play, contributing to institutional contradictions (Friedland and Alford 1991). For example, in the context of Geographical Information Systems (GIS) use in the forestry sector in India, Sahay and Walsham (1999) elaborate on two logics in play. The first concerns how foresters make decisions on forest management based largely on political and social considerations, such as the Minister of Environment and Forests wanting to implement water conservation activities in his political constituency. The second concerns the contradictory logic inscribed in the GIS, which is itself based on making such decisions (of locating forestry interventions) via scientific modeling enabled through the GIS. The interplay of these two logics, Sahay and Walsham point out, contributes to the less-than-effective uptake of the GIS in the forest department.

Such contradictory logics can also provide the potential for eventual change. Thornton and Ocasio (2008) discuss four mechanisms of change: (a) insti-

tutional entrepreneurs, who are agents of change and play a critical role, taking advantage of the position they assume in social locations; (b) structural overlap, which occurs when previously distinct organizational structures are forced into association; (c) event sequencing, or the temporal and sequential unfolding of events that dislocate and transform interpretation and meaning of cultural symbols; and (d) competing institutional logics that may facilitate resistance to change and can be pre-existent or a consequence of change. For example, Currie and Guah (2007) illustrate how competing institutional logics (the change initiator vs. healthcare practitioners) influenced an IT-enabled change in six UK National Health Services. It is also worth noting that institutional change brought on by a change in the institutional logics does not necessarily happen from the periphery. The exposure to different institutional logics may increase the awareness of shortcomings of the dominant logics and enable central actors to become institutional entrepreneurs (Greenwood & Suddaby, 2006; Thornton & Ocasio, 2008).

Deinstitutionalization

Negotiating and reconciling conflicting institutional logics may contribute to the deinstitutionalization of the existing logic and re-institutionalization of the new (Jepperson, 1991). Deinstitutionalization is “a process by which institutions weaken and disappear” (Scott, 2001, p. 182), and it “takes place when established meanings and action in an organization are discredited, either as a result of competing meanings and actions or because they are seen as failing to contribute to the institutional *raison d’être*” (Avgerou, 2002). Further, Oliver describes deinstitutionalization as

the process by which the legitimacy of an established or institutionalized organizational practice erodes or discontinues. Specifically, deinstitutionalization refers to the delegitimation of an established organizational practice or procedure as a result of organizational challenges to or the failure of organizations to reproduce previously legitimated or taken-for-granted organizational actions. (Oliver, 1992, p. 564)

Oliver points out three key factors that contribute to deinstitutionalization: political, functional, and social. Political pressures may evolve under threat of erosion or displacement, as new and emerging practices may challenge the utility and legitimacy of

existing ones. Functional pressures relate to technical or functional considerations that may compromise or raise doubts about the instrumental value of an institutionalized practice. Social pressures include increasing normative fragmentation within an organization as a by-product of other changes, such as increasing workforce diversity or addressing the problem of high turnover. There can be disruptions to an organization’s historical continuity, such as mergers, or changes in state laws that can prohibit or discourage the perpetuation of an institutional practice and its associated deinstitutionalization. For example, Nicholson and Sahay (2009) observed the role of dissensus and consensus—around both political and cultural factors—in the software exports policy-making process in Costa Rica, with the former leading to erosion of institutions, and the latter reinforcing existing institutions. Apart from intentional change processes (for example, purposely dissenting), there can be unanticipated or unintentional consequences of purposive activities leading to new institutions (Hwang & Powell, 2005). Moreover, Currie (2009) illustrates how functional pressures were confronted by normative pressures in deinstitutionalizing the existing professionally dominated UK healthcare sector to a new institution based on market mechanisms.

In summary, the focus of our theoretical analysis is to first identify the existing and proposed institutional logics surrounding the introduction of computer-based health management information systems in Tajikistan. The concept of deinstitutionalization further helps us to theoretically understand the interplay between different logics, why certain logics stay, why others erode away, and what social, political, and functional pressures contribute to this.

3. Research Methods

Research Approach

A useful method to develop and implement an HMIS in developing countries, suggested by Braa, Monteiro, and Sahay (2004), is that of action research, based on the principles of “networks of action” (p. 339). They build this argument within the context of a global interaction identified as the Health Information System Programme (HISP), which involves, among other things, the design, development, and implementation of a free and open-

source software called the District Health Information Software (DHIS). Taking their point of departure of trying to address the commonly perceived problems of lack of sustainability and scalability of HMIS in developing countries, the three authors draw on Elden and Chisholm (1993) to argue for the need to carry out action research in networks, rather than in singular units. Such an approach, they argue, provides the potential for multiple sites to learn with each other, share experiences and knowledge, and plan and implement action in a context-specific manner.

With this in mind, we applied an action research approach and addressed the question of network-building at both a global and local level:

1. Global level: Examine how the global HISP network could be leveraged to support the process of adaptation to the local context of Tajikistan, and mutually, how the global network could learn from the Tajikistan experience.
2. Local level: Within Tajikistan, understand what kind of sociopolitical, technical, and health-related networks could be mobilized to support overall project aims of HIS-related reforms.

The specific interventions that we carried out with respect to building these networks of action at the two identified levels are summarized in Table 1.

Data Collection Methods

Data were collected through various means. The following two tables summarize the data collection methods applied. While Table 2 provides detail about the type of methods we used and when they were conducted, Table 3 sums up the respondents by institution, issues raised, and length of the interview.

Data Analysis

At the end of the intervention in Tajikistan, while organizing our material, it became clear that most of the challenges encountered could be ascribed to different mindsets. This led to a categorization of events into these conflicting mindsets. The interview transcriptions and meetings notes were increasingly seen in this light, and we distilled the underlying

assumptions that led to the different views. This, in essence, led to the institutional logics discussed in this article, while the literature review was not initially focused in this direction. It increasingly became clear, however, that theories of institutional logics provided us with the language to analyze and communicate these findings.

4. Case Study

The project started when a University of Oslo professor was invited by the ADB (Asian Development Bank) to work with HSRP on the design, development, and implementation of a computer-based HMIS in Tajikistan. The project was carried out over an intensive period of about three months from November 2007 to early February 2008. Broadly, the project components involved an initial situation analysis and identification of local technical partners, followed by a month of systems development and the pilot testing of the first prototype, and then by two weeks of initiating pilot testing in one district (Kulyab). The case narrative is structured in two sections: (a) the existing situation that highlights institutional logics already at play; and (b) the HMIS intervention, which summarizes proposed institutional logics. In both these sections, the focus is on artifacts and processes, which are the manifested expressions of the institutional logics we studied. At the end of each section, we have distilled out the institutional logics they represent.

Existing Situation: Institutional Logics at Play

Central control of the HMIS was under the Medical Statistics division (MedStat), which, true to its name, treated the HMIS as an annual statistics-generating tool. The MedStat division used out-of-date software (also called MedStat) built on a FoxPro platform that basically was capable of entering data on the existing 37 reporting forms by the facilities and generating the aggregated reports by rayons, oblasts,¹ and nationally. From the reporting forms, two were reported monthly, and the rest were done annually. MedStat was not capable of generating any indicators (such as percentages or rates per thousand that required calculation with a numerator and denominator). For this purpose, the required

1. Rayon and oblast are the Tajikistani equivalents of district (typically 50,000 to 100,000 inhabitants) and province (10 to 15 districts), respectively.

INTERPLAY OF INSTITUTIONAL LOGICS AND IMPLICATIONS FOR DEINSTITUTIONALIZATION

Table 1. Interventions and Their Relation to "Networks of Action."

Action interventions carried out in Tajikistan	Global network building and leveraging	Local network building
Situation analysis: Document study, interviews, presentations, discussions	<ul style="list-style-type: none"> • Adopt best practices from global experience to the specific needs of Tajikistan • Gain experience from Central Asian primary health care practices 	<ul style="list-style-type: none"> • Enroll participation in HMIS reform process • Establish local network covering the fields of health and IT • Build awareness of HMIS challenges and ways to address them
Software development: Expand functionality, database design, application translation, report generation, creating validation rules	<ul style="list-style-type: none"> • Adapt Global DHIS to the Tajikistan context • Advance DHIS with new functionalities developed in response to Tajikistan requirements • Enroll Tajik competence in global DHIS development • Establish a software development node in Tajikistan that could potentially serve as a future hub for Central Asia 	<ul style="list-style-type: none"> • Develop a local team committed to free and open-source software development • Develop feedback mechanisms between users of DHIS in the district and the developers • Build capacity of local team to support HSRP and build the community of users
Capacity building: Training sessions and follow-up activities at district and national levels	<ul style="list-style-type: none"> • Adapt training material and practices from other settings to Tajikistan • Contribute to global repository of training material and examples from Tajikistan • Create training material in Russian that could be made available to other Russian-speaking nations 	<ul style="list-style-type: none"> • Formalize training procedures and content for health information officers • Develop training capacity at national and district level • Conduct orientation training to help create greater buy-in and support

data were fed in separately to a WHO-created program called Data Presentation System (DPS), and the generated indicators were uploaded into a national Web site. Another program, Factor, obtained data from the oblasts on five variables related to maternal health. Electronically, the three programs did not "speak to each other," despite all being under the control of the MedStat division; the IT specialist said there were no plans to further upgrade the MedStat software.

Below the level of the 37 forms that corresponded to different health programs (with a great deal of overlap and redundancies) were another 367 recording forms used at the primary health facilities to record the provision of basic services. At the rayon level, the different health programs put their respective data on MedStat forms, which were then sent to the corresponding oblast health program, as well as to the Statistical Department at the Central Rayon Hospital. Further, there were parallel report-

ing systems in place, with both the health programs and the MedStat department sending the same information to their corresponding superior level. However, since the MedStat software was not compatible with other software, computer use was limited. A tuberculosis (TB) program manager described this:

Also, we have 16 computer specialists, but only in Kulyab and Dushanbe. But the problem is we cannot use the data from Kulyab and Dushanbe which is entered in Epi Info, because we have to adapt the data to be entered in MOH formats. So, to MedStat, we only send data on written form . . . this is a structure which is more than 75 years old. (TB program manager, Dushanbe, November 2007)

Further, poor IT resources in particular health divisions further impeded the use of computerized data, as related by a deputy director of the national TB program:

Table 2. Overview of Data Collection Methods.

Type	Nature and volume	When
Interviews	10 at national 6 at district	Situation analysis Pilot implementation
Presentations	4 for Asian Development Bank (ADB), Ministry of Health (MOH), donor partners, and closing presentation for HSRP, MedStat, and MOH	Situation analysis and at end of project
Workshops	Training and discussions: one for national level participants, one for province and district level, and one in pilot district for district health programs	Launch of Version 1: Tajikistan HMIS and pilot project
Document study	Previous projects reports, current reporting forms	Situation analysis
Informal discussions	Numerous with HMIS consultant, HSRP staff, local software developers	Daily
Participant observations	Use of MedStat software at national and district level. Study of information flows and practices around recording of data, use of registers, and so forth	Regularly
Data collection through e-mails	E-mails with HMIS consultant, software team, and among ourselves	Continuous and ongoing
Software prototyping	During definition of datasets, creation of reports, identification of controls	Continuous and ongoing

Table 3. Interviews Conducted.

Institution	Respondents	Types of issues raised	Time
Different national health programs	Deputy director or director level	Current system and its challenges, data quality, information needs, information gaps	1.5 hours
Different district health programs	District or central district hospital program directors	Information flow, use of information, reporting routines	30–45 minutes
International NGO	Country representative and HMIS representative	Past experiences of HMIS implementation in which they were involved	1.5 hours
Local software entity	Director and staff	Technical and infrastructural challenges related to software implementation	1.5 hours

We want to include all data in Tajikistan, but some is always missed. Now we need one IT specialist and train him full time to work on Epi Info. How we reach the 66 centres, when we have no budget, no travel money, no nothing? (Deputy director of the national TB program, Dushanbe, November 2007)

Further impediments to the use of computers were the availability of and permission to use paper. We were told that paper was not regularly provided, and that the limited budgets did not allow for its local purchase. For instance, in the Kulyab district, the yearly budget for gasoline would be spent in

just a couple of weeks of normal activity, so the purchase of paper was not a high priority. A donor agency senior official narrated how inventive methods were applied to produce reports at the local level:

When asked how the reports were prepared, he (a doctor at the rayon level) said he will tell (about how reports were prepared) if his name is not quoted. He said he bought one chocolate to the room of the specialist responsible for the data. The specialist generated the report for the whole district. We (the aid agency official) told [the director of MedStat] that this is the cost of

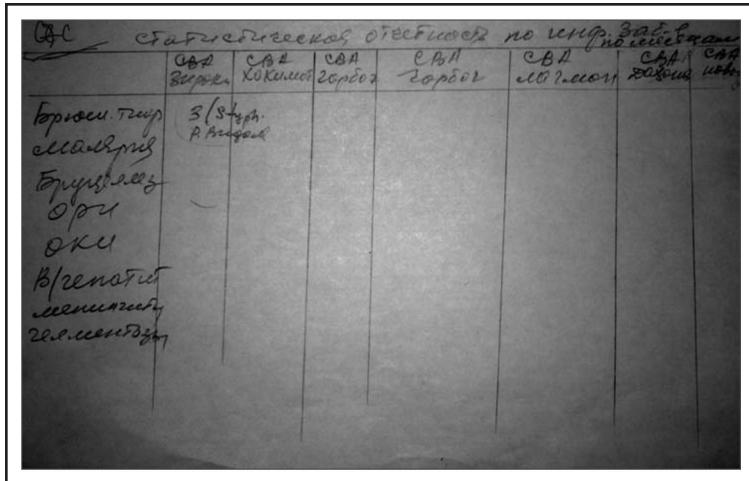


Figure 1. Emergency Form on Infectious Diseases with Key Diseases (listed in rows) and Rural Health Centers (listed in columns).

institutional logics at play. They were not the only institutional logics identified, but they were dominant and stood out because they so clearly contradicted what we tried to introduce (see next section for explanation). The first was a central planning logic—perhaps a set of logics—where a curative, rather than preventive, approach was taken. This was evident by how the data were collected for top-level use only, with the focus being on collecting raw data, rather than on calculated indicators, on an annual basis. Supporting this was the HMIS-inscribed logic, where we found the system to be built for one purpose only: the provision

of statistics for central planning. It was not designed to support local use, as evidenced by the extra emergency form that the Kulyab district office had developed for this purpose. Related to this is the gigantomania we mentioned earlier of wanting to cover—to the smallest detail and on a routine basis—all data that could be related to health. For much of the data, it makes more sense to do periodic surveys, rather than to aim for complete national coverage of data collection every year. The other key logic was one that linked to paper technology, in that once the forms had been agreed upon, they could not be revised before the end of the five-year planning period. Even when showing how improvements could be made to the forms, the perceived costs of such action were based on a completely paper-based system. In a computerized environment, this rigidity becomes meaningless.

your reporting system—one bar of chocolate. (Donor agency official, Dushanbe, November 2007)

Given the huge amount of the data to be reported (about 30,000 data elements) on a routine basis, the extremely poor HMIS-related resources, and the view that reporting was an irrelevant exercise, data quality obviously suffered. The head of the HMIS task force at the MOH admitted that the use of the ICD 10 codes for classification was fraught with errors, and he estimated that 35% of the data in this system would be incorrect from classification errors itself.

The reporting forms were poorly designed and comprised multiple subforms. For example, we found a form titled “Treatment Prophylactic Activity of Facility” that contained about 50 subforms, covering 1,836 data elements and spanning about 75 pages. This “gigantomania” fostered intermediate forms that were designed locally for local use. For example, the Infectious Diseases Department at the central district office provided what they called an “emergency form” that listed eight essential diseases (with space left for others) reported by the different rural health centers (shown as columns). This form (Figure 1) was used for local purposes in addition to the standardized recording and reporting forms that were prepared for national reporting.

Based on these findings, we identified two key

existing institutional logics we identified are summarized below:

- Central planning for statistics management (supporting curative rather than preventive health), based on:
 - Centralized structure rather than decentralized.
 - HMIS as annual statistics-generating tool.
 - Gigantomania collection of extensive data signals, seriousness, and scientific vigor.

- Rigidity of paper means that decisions are final and static for the duration of planning cycles. Computers can be employed to automate paper-based systems.

HMIS Intervention: Proposed Institutional Logics

The proposed HMIS was a system based on a free and open-source HMIS application designed and developed under the HISP network (Braa & Hedberg, 2002). The institutional logics behind our suggestions were based on: (a) a belief that local decision-making produces the quickest and most appropriate response to emerging health issues, based on routinely collected essential data; (b) the HMIS thusly being indicator-driven, so as to be able to compare across time and space, as well as to collect data that is necessary for taking local action, which we strongly believe is the result of; (c) a much smaller data set to reduce the burden of collection, improve quality, and enable decision makers to process it adequately; and (d) technology's role being to internalize routine aggregation, increase flexibility, and decrease response time, rather than to increase the capacity and speed of a system that adhered to a paper-based design logic and five-year planning cycles.

A first step in the design process was the reorganization of the existing data forms. We proposed to organize health data in relevant health categories rather than on forms. Further, we suggested that data be organized into two broad categories: routine data (reported monthly) and semi-permanent data (reported annually).

In addition, we suggested a radical reduction of data to be collected and a shift to indicators (rates and ratios), rather than just data elements (counts). A smaller system would have a positive impact on both time consumption for data entering and ambiguities related to correct use. Hopefully, it would also help to improve the level of data quality. Through shifting the focus from counts to indicators, the data would assume relevance for decision-making across time and space.

However, our proposal for redesign based on data sets (and not forms) was rejected. We were told that the Central Statistics Authority had approved the existing 37 reporting formats, and that we were not even allowed to change or add a logo to the form. We were not even allowed to change

the location of a single piece of data in the existing formats. So, we then made a design decision that each of these reporting formats would represent a data set, with groups defined in each of them, and with each corresponding to a subform. Our design approach, then, resulted in the development of a maximum data set, rather than a minimum data set. We rationalized this rather unpleasant decision to automate existing inefficiencies by telling ourselves that this one-to-one approach would allow us to input the existing data into the computer. This step could then be followed with analysis of existing data, which would make the poor data quality visible to the planners, and thus allow us to make a stronger argument for applying a minimum data set approach in the next iteration. But, as the World Bank representative noted, a smaller system was not seen as compatible with central planning, and he was skeptical about our chances of success:

We wanted to simplify the system. When the consultant showed the MOH a system with 15 indicators, they laughed, how can it meet the needs of the health system? They laughed and did not accept it. This is the paradox—we want a huge system, but don't have the money. They are suspicious of small systems. (World Bank representative, Dushanbe, November 2007)

The issue of control rules is worth mentioning. The tabular forms in MedStat required many data items to be recorded twice. For each row item, such as Malaria, there would be columns both for age groups and gender, as well as a column for the total. Data would then appear twice, both in a specific age group and in the total. In the software application (DHIS) introduced, data items could be calculated automatically by aggregating other items; totals, then, can be produced on demand and not have to be entered at all. This could reduce the amount of data items by around 3,000. However, this automatic aggregation of totals was not to be implemented, as it was still the MedStat administration's intent to manually enter totals and then run checks on them against their various components. This function had been included in MedStat software with a set of so-called "controls." These controls made sense in a paper system, where manual aggregation into totals could produce errors. This "paper verification logic" was applied to a computer system where the possibility of manual aggregation

error could be eliminated altogether. The MedStat team insisted that development of the same set of controls in DHIS as in MedStat be a compulsory requirement. These examples of often-contradictory assumptions and directions point to the different underlying institutional logics in play; they also helped us to identify our beliefs and assumptions as also being rooted in certain logics.

The HMIS intervention-related institutional logics we identified are summarized below:

- Decentralized decision-making, based on routine data, specifically:
 - HMIS is indicator- and action-led.
 - Small, essential data sets best support action and improve data quality.
- Computer systems should be employed to internalize routine aggregation, increase flexibility, and decrease response time to changes in epidemiological information needs.

5. Analysis: Interplay of Logics and Implication on Deinstitutionalization

In the case study, we elaborate on the institutional logics found to be in play when conducting the situation analysis of the HMIS in Tajikistan, as well as the logics that we believed were inscribed in the HMIS-related intervention that we were seeking to introduce. In this analysis section, we will describe the interplay of these two sets of logics and how this shaped the deinstitutionalization process we wanted to bring about in the existing HMIS. Specifically, we discuss two sets of interplays:

1. Statistics for central planning and control versus using information for decentralized action
2. Rigidity of paper-based reporting formats versus the flexibility of customizable electronic forms

Statistics for Central Planning and Control Versus Using Information for Decentralized Action

The Tajik system is a historical product of a Soviet system of governance, and nearly two decades after the collapse of the USSR, the deep-rooted Soviet institutions can still be seen in play. In another context of collectivization (before WWII), this has been

described by Scott (1999) as “gigantomania,” referring to the focus on trying to collect huge amounts of data as a form of centralized planning and control. In the post-Soviet system in contemporary Tajikistan, the routine health system seeks to collect data on more than 30,000 data items relating to all kinds of diverse items, such as soil samples, airplane vibrations, and cigarette smoking, as well as health programs.

Further, the Soviet system prides itself on being based on a strong scientific foundation. This historical tendency is reflected in the Tajikistan’s MOH decision to use the full version of the ICD10 system. The implication of this was that each disease was classified by various codes, and that each code had various subcodes and sub-subcodes. In the Soviet era, when there was a high level of scientific and technical experts, the data collected from the peripheral levels was subjected to a serious scientific scrutiny at the central level. Now, however, the number of such experts has been dramatically reduced. While similar levels of detailed data are expected to be collected, there has also been a simultaneous decrease in both the capacity to collect good quality data and in the skills to analyze and use the data.

In contrast to this existing system, the HISP philosophy—under which all authors have been working for years in other countries—toward HMIS development can be seen to be a historical product of postapartheid 1994 South Africa, a period of ANC-driven reform that was based on an agenda emphasizing decentralization and integration (Braa & Hedberg, 2002). Within this context, the HISP project sought to develop free and open-source software that could be installed at the local levels. Large-scale capacity-building programs would be carried out to empower health workers and compel them to use information for local action. These principles and practices of the HISP initiative were inscribed into the design of the DHIS software, which emphasized local flexibility and user control, and became part of the training material used for processes of capacity-building for the health staff.

However, adapting these principles of use of information for local action in Tajikistan would involve incorporating a whole range of HISP principles, including the creation of a minimum data set, the linking of data being collected with indicators, and the implementation of large-scale capacity

building programs of the health staff, with a focus on the use of information at the local level. However, we soon realized that these aims were unattainable in the present scenario. First, no permission could be obtained to make any changes—even the removal of duplicate data elements included in the same form. Further, the system we found was not mature enough to absorb the shock of these large-scale and radical changes. Since even the basic information processing systems were not in place, such as those for collecting quality data, it was too ambitious on our part to expect local staff to start on the analysis of data. Further constraints included the poor capacity of the health staff, very weak infrastructure, and the extreme climatic conditions that made it difficult to travel to the districts to carry out the training programs.

The interplay of the two sets of logics thus resulted in our adapting a strategy of maintaining the status quo in terms of the reporting forms, their numbers, and their design, but by translating this status quo into an automated form. We reasoned that the information inscribed in this status quo system would spotlight the poor quality and the absurdity of the current design. We believed this could help us make a stronger case for change in the future, and when changes were approved, we would be able to easily adapt the system to the flexible DHIS-based HMIS application.

Rigidity of Paper-based Reporting Formats Versus the Flexibility of Electronic Customizable Forms

For both institutional and technical reasons, the paper formats in use were inscribed with a deep sense of rigidity. Institutional reasons for this included the costs associated with the production of new formats, the logistical problems of reproduction, and the difficulty of distributing them to hundreds of facilities, some of which were located in geographically inaccessible regions. The size of the individual forms made the task of changing a paper-based form daunting. Furthermore, the existing forms had only recently been approved by the Central Statistical Authority, so no further revisions could be made for at least five years, which corresponded to the national planning cycle. The technical reason contributing to the rigidity of the form was their much-cluttered design, full of multiple rows and columns. Some of the forms had approximately 250

rows and 12 columns, making them very difficult to modify in technical terms.

Bathed in the philosophy of flexible systems and local action, HISP saw forms as something very flexible that could be modified at will, based on user needs. The entire software had been built on a modular structure, and changes could easily be made at the data entry level without affecting other parts of the system. Furthermore, some technical innovations were created by the software development team, particularly the “multi-dimensional” data element that was developed to replace the existing uni-dimensional data element. Through this innovation, previous multiple uni-dimensional data elements (for example, children in different age categories were treated as different elements) could now be treated as a single data element (children) having multiple categories (representing age groups). This innovation was combined with the development of a customized data entry screen that replicated the paper form versus having to enter data through a list of data elements organized vertically. The following screen shots (Figures 2 and 3) illustrate the two systems of data entry. The combination of these two technical innovations provided our team with a great deal of flexibility in the design of the forms.

The interplay of these two logics occurred when we started to make suggestions in the design of the screens, showing how space could be used better, or by making aesthetic-based improvements. However, we still did not get permission to make changes. When we suggested trying out some new designs on an experimental basis—we could revert back to the original design if they did not work—we were again denied permission to make these kinds of revisions.

Interplay of Logics and Implications for Deinstitutionalization

As Oliver (1992) has pointed out, deinstitutionalization arises from social, political, and functional pressures. If these pressures gain enough momentum, they can create a sense of dissensus in the existing institutions and provide the impetus for their dissipation or erosion. In the case we described earlier, the interplay of the institutional logics could show a great deal of functional dissensus and demonstrate how the existing system was operationally inefficient, based on receiving poor quality data and

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1. INFECTIOUS DISEASES																	
Name of disease	№ row	Code ICD-10	Registered diseases									From paragraphs 3, 4, 5, 6 organized		Rural inhabitants		Registered death cases	
			Total	From them								Nursery visits	Visits of kindergarten	Total	including 0-14 years	Total	including 0-14
				0-14 Years old	0-1 Years old	1-2 Years old	3-4 Years old	5-6 Years old	7-14 Years old	15-17 Years old	18-19 Years old						
A	B	C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Infectious diseases, total	1																
Cholera	2	A00															
Vibriocarrer of cholera	3	Z22.1															
Abdomnal typhoid	4	A01.0															
Paratyphoid A, B, C	5	A01.1,2,3,4															
Bactenocarrer of abdominal typhoid and paratyphoid	6	Z22.0,1															
Other salmonellosis infections	7	A02															

Figure 2. Form 1 Customized Data Entry Form (English version).

Nr	Data Element	Min	Entry	Max	Comment
1	cholera		<input type="text"/>		[No comment] <input type="button" value="v"/>
2	infectious disease total		<input type="text"/>		[No comment] <input type="button" value="v"/>
3	vibrocarrier of cholera		<input type="text"/>		[No comment] <input type="button" value="v"/>
4	abdominal typhoid		<input type="text"/>		[No comment] <input type="button" value="v"/>

Figure 3. Form 1 With Data Elements Listed Vertically in Standard Layout.

providing data that could not be used. We demonstrated this functional deficiency through our analysis; for example, we showed that nearly 90% of the data was being reported as zeros or blanks on some of the forms. We also argued that while a huge amount of data was being collected, no indicators were being used. The Ministry of Health, however, insisted that all data being collected were being used as indicators. When we showed examples to the contrary, they were simply dismissed as being exceptions.

A degree of social pressure had been placed on the MOH to reform their HMIS through efforts of the World Bank and the ADB that had created specific structures (for example, the HSRP office) for guiding reform efforts. However, as the HSRP was an independent structure and had a time-bound life of three years, its recommendations were non-binding for the MOH. On the political front, we failed to create adequate momentum and pressure to trigger change. The political decision-making center was at the MOH, an organization closely aligned with MedStat, so our influence there was minimal. Our alignment was with the ADB, primarily considered a donor (and that in the form of loans) and thus not sufficiently powerful to enforce change.

In summary, it could be seen that the interplay of logics primarily occurred on the functional domain. Confronted with a strong, historically embedded system, we could hardly make a dent on the political domain. However, where we did succeed was in creating some seeds of change, primarily by building a system with an inscribed flexible logic that could be modified into a more effective HMIS in the future (when political conditions might be more favorable). Also, through our various reports and presentations, we introduced new discourses into the HMIS reform efforts, such as those related to use of information, use of indicators, and data quality and validation. So, while some seeds for deinstitutionalization were planted, there was not adequate political pressure for deinstitutionalization to take place at the time. We should also note that institutional change processes can be painfully slow. Future efforts in this direction could focus on gathering a critical mass of supporters with enough power to influence these change processes. However, while arguing for even piecemeal change at the ministerial level, we found a reflection of our own ideas and philosophies in the pilot district of Kulyab. There, the so-called emergency form captured precisely the kind of logics with which we had become acquainted in

South Africa. The district needed a limited set of data on notifiable diseases to be able to manage and assist its rural health centers in case of an outbreak. This form was not part of the official HMIS, but the doctors and managers maintained this extra system, despite all the work they required to complete the official forms. From this, it is clear there were domestic seeds of conflicting logics, but the (weaker) district's strategy was to avoid conflict. The training in data analysis in Kulyab, using local data, was met with a degree of enthusiasm beyond what would be found at the national level. These local-central differences in logics guiding behavior were also found in a similar study in Cuba (Sæbø & Titlestad, 2004), a country sharing some political and economic history with Tajikistan.

7. Conclusions

The interplay of the two sets of logics basically involved two paradigms, which at one level were irreconcilable and could not coexist. However, we believe that in such a historically embedded system, a paradigm shift could only come about if mandated explicitly from the top political authority—the health minister. While local level incremental efforts may be useful to create some local expertise and knowledge, these lower levels have no authority or voice to influence change. The strategy of local empowerment, which had worked for the HISP project in South Africa, was a product of the historical moment that existed, one arising from the breakdown of the apartheid system and the political agenda that mandated decentralization and integration.

This study makes some interesting contributions to the IS field. First, it brings into focus a study from a country that, to date, has been nearly invisible to the IS community. Hence, the article expands the already existing knowledge about IT-enabled HMIS change process in developing countries. Second, it contributes to the debate about bottom-up and top-down implementation models by arguing that such decisions are products of historical circumstances, and that bottom-up, though ideologically appealing, may not be always most effective. Third, the conceptual framework of institutional logics, their interplay, and implications for deinstitutionalization provides an interesting approach to study implementation experiences more broadly, not just HMIS in a

post-Soviet republic. In other circumstances, there would be different forms of logics in play; studying them would provide rich insights into the implementation dynamics. ■

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