The Institutional Logic of Digitalism: Exploring The Aftermath of Large-Scale Technology In Healthcare Organisations

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Abstract

Background: Healthcare organisations experience organisational difficulties and inertia in the implementation of large-scale information and communication technology (ICT). The ongoing discussion concerns the full understanding of these changes and the interplay between ICT, innovation and organisational change.

Methods: We introduce 'digitalism' as a new institutional logic in healthcare organisations, alongside managerialism and professionalism. To develop our argument, we combine organisational and institutional logic theory with information systems research into enterprise architecture and large-scale ICT systems. We illustrate our arguments with a multi-source case study of a process of organisational development before and after the implementation of centralised large-scale ICT systems at a large Norwegian university hospital in 2015.

Conclusion: Understanding of digitalism, blending and competing with traditional institutional logics in healthcare organisations, gives insight into how large-scale technology and organisations are tied together and can contribute to effective healthcare management and prevent organisational inertia.

Background

Scholars have shown how new information and communication technology (ICT) contributes to innovation and increased efficiency, thus enabling new arenas and patterns of behaviour.(1–5) The ongoing discussion concerns the full understanding of these changes and the interplay between ICT, innovation and organisational change.(6, 7)

Someone with a basic understanding of information technology might refer to ICT merely as a tool. However, such a perception would ignore its more profound impact on an organisation's governance structure. Earlier studies of technology have argued for a special approach to resituate the study of technology to organisations.(8–11) Barley (8) treated 'technology as a social rather than a physical object, and structure is conceptualized as a process rather than an entity'. This was further developed by Leonardi and Barley together (12, 13), who concluded, 'There is general agreement that information technology and organisations both arise at the intersection of social and material phenomena. What remains unresolved, however, is […] how information technologies and organizing are tied' (p.160). Leonardi and Barley (12, 13) showed that studies very often tend to overemphasise either technology in a deterministic perspective (contingency theory) or in a voluntaristic perspective, as well as the agency in organising (social constructionism). However, the information systems (IS) literature and more recent organisational change studies have made progress in understanding how parts of technology constrain and create inertia while other parts initiate change. The literature describes workarounds and how adaptation to technology differs, making the processes both deterministic and voluntaristic.(2, 5, 13–16)

We argue that ICT is to be analysed through its social impact, as a carrier of social norms and values, and the structure is conceptualised as a dynamic process. In this article, we show how ICT in organisations

could be seen as an institutional logic in itself. We suggest 'digitalism' as the term for a new institutional logic, as opposed to other, more well-known logics in hospitals, such as managerialism and professionalism. Applying an institutional logic approach to understanding ICT allows us to unfold a pattern and explain the impact of change and stability that ICT has on organisations. To develop our argument, we combine organisational change research and institutional theory (16) with IS research on enterprise architecture (17) and large-scale ICT systems. The institutional perspective unfolds the institutional features of large-scale ICT and contributes to the explanation of strategies, which encompass organisational change and development, in a dialectic manner of both deterministic and voluntaristic perspectives.

Digitalism represents a new way of understanding organisational development and adaptation, and it challenges the mainstream understanding of organisational behaviour as well as the established IS literature. The aim of our research is to analyse the implementation of ICT systems in healthcare organisations according to this theoretical framework. In the last part of the article, we give a discussion of the impact of different blends of institutional logics and why it is useful to understand ICT as an institutional logic in itself. The practical results of ignoring digitalism and instead only seeing ICT as a tool are unwanted inertia and organisational dysfunctionalities. We illustrate our arguments with examples from a case of ICT implementation at a large Norwegian hospital where digitalism was not acknowledged.

ICT systems as a driver for change?

We chose to study this phenomenon in the health sector because of the sector's process of large-scale digitalisation. Large hospitals change different parts of their structures on a regular basis. Typical of this would be to split, move or merge departments in search of new ways to co-ordinate services. Still, day-to-day routines and practices do not necessarily change. The inertia of organisations has been explained by the culture of healthcare providers and resistance of employees to change.(18, 19) New technology is presumably a driver for change. It is commonly understood that new technology has the ability to be ground-breaking and to push boundaries in finding new ways of organising work and co-ordinating activities.(8) New technologies open up new ways to organise services. Physicians can, for instance, gain access to x-ray images and laboratory results anywhere in a hospital as long as they have access to a computer. They do not need to have these sent by mail or to go to the laboratory department themselves to read the results. This, however, requires a large-scale common ICT system that integrates all parts of the organisation.

Methods And Materials

Our arguments are illustrated by observations from a case study of a large-scale technology implementation process at Oslo University Hospital (OUH). We observed organisational change and inertia in the aftermath of the implementation of a new patient record system, the Distributed Information

and Patient-data System (DIPS), in 2015. This took place alongside the merger of several large-scale information systems for finance, HR data and clinical data (i.e., laboratory information, x-rays images).

This case study is believed to be well suited for an exploratory study, since the processes were complex and the data needed to be extracted from several sources.(20, 21) The case study includes data from document analysis, field observations and interviews with individuals and focus groups (Table 1).

Table 1. Overview of data sources

Phase	Data source
2014-2015 Pre-implementation phase of DIPS system	SWOT analysis for each hospital department, 11 focus group interviews, 15 project meetings, 10 steering group meetings, observations
2015-2016 During implementation of DIPS system	Documents, OUH audit report 2015
2019 Post-implementation aftermath phase of DIPS system	Documents, 5 individual in-depth interviews

The data were extracted from documents and observations from December 2014 to January 2016 during an organisational audit before DIPS was implemented at OUH. One of the authors participated in this audit (22) and attended 11 focus group interviews, 15 project group meetings and 10 steering group meetings. The documents from this period include the report from 2015, memos and minutes from the working groups and notes from SWOT-analyses performed during the audit. The audit represents the baseline and background of this study.

In addition, a follow-up study was performed in February 2019 by interviewing five key personnel who had been involved in the implementation process. These senior leaders were selected because we knew from our experience from the audit that they represented different groups of personnel (HR, technical, medical) and had different perspectives of the process. To triangulate our emerging insights, we combined our insight gained from the audit from frontline personnel and SWOT-analyses with the interviews with the senior leaders. We asked the interviewees to reflect on their experiences from the audit, as well as from the ongoing re-organisation. These interviews lasted approximately one to two hours and were transcribed with the permission of the interviewees. Our theoretical framework guided coding and the extraction of data.

Ethics approval and consent to participate

Ethics approval was received from the Norwegian Centre for Research Data, application no. 59416 regarding the in-depth interviews. Participants received information letter and informed consent was obtained from all participants prior to participation in the study. The data were handled according to the Norwegian Personal Data Act, and they complied with the GDPR ethical requirements. Permission to

access and use other data sources described in this study was given by Oslo University Hospital and described in a report available upon request.(22) The project was conducted in line with the Helsinki declaration.

The case of Oslo University Hospital

OUH is the largest and most comprehensive highly specialised hospital in Norway, and it serves as a local hospital for the main population of Oslo. It is the result of a merger of four hospitals and employs 23,000 people. The former four hospitals had different digital platforms for patient records, referrals, HR systems, digital radiology services, laboratory services and other test services. Gradually, since the merger in 2009, OUH has standardised and merged its digital systems. Simultaneous with the creation of new opportunities through digitisation, OUH has experienced new challenges related to both operations and development. In 2015, it converted its various patient record systems into a single one through the implementation of the new DIPS patient record system. This implementation required the hospital to be 'frozen' for one year, meaning that departments providing patient treatment were not allowed to change their structures in order to reduce complexity in the implementation process. The DIPS system implementation, as such, was perceived as a success with only minor problems.

OUH established a standardised central model for the representation of formal organisational structures in ICT systems. This meant that the administrative ICT system, incorporating data from human resources and finance, and clinical systems such as those for DIPS, lab results and x-ray images, were all connected and related to a unified representation of the organisational structure. All systems were integrated with the aim of enhancing and ensuring their overall quality. Altering one system would affect all the others.

The structure of the hospital has changed on a regular basis. It is said that the hospital makes 150 to 200 small and large organisational changes per year.(22) OUH consists of about 1000 organisational units distributed across five levels. During the period when the organisation was frozen, a revision of this structure was performed. From this followed a recommendation to split several of the clinics. In January 2016, the hospital went from nine to 15 clinics, with the intention of further splitting underlying departments. The reason for dividing the clinics was the belief that this would lead to them becoming more manageable in order to better achieve financial goals.(22)

The unified representation of the organisational structure of OUH ensures that all ICT systems are based on the same organisational setup. Changes in the organisational structure must then be implemented almost synchronously across all systems to ensure unambiguous organisation for internal and external reporting. However, it was a challenge to represent the hospital's actual structural organisation in DIPS, and this limited the choice of organisational solutions. Sources told us that the organisational structure, to a certain extent, was dictated by the ICT systems—something that was seen as an unfortunate but unavoidable outcome. ICT systems were seen as constraining the organisational structure and increasing the number of issues to consider before a change, especially at the lower levels of the organisation. Several months later, after DIPS had been implemented, the organisational structure slowly thawed, allowing OUH to develop a strategy to enable organisational change. An expert group comprising ICT

personnel and DIPS experts was assigned to plan for organisational change. This group sensitised the challenges and assessed the restraints of organisational change. It also advised the unit of the pros and cons of different choices of structures, often suggesting less radical changes that would ease the process of change.

By 2020, and locked in inertia, OUH continued to strive for a solution. The solutions presented and discussed continued to be more about what did not work. More standardisation and centralising processes resulted in the increasing frustration of external partners, who are unable to meet the demands for change and flexibility. The case of OUH demonstrates what happens when ICT systems are seen as merely neutral and designable tools.

In order to fully understand how ICT systems and health organisation processes are tied, the implementation process need to be analysed in a broad theoretical framework that includes the insights of digitalism.

Digitalism – a new competing institutional logic

Organisations such as hospitals are affected by several competing institutional orders or logics.(23–25) Studies from Scott and colleagues on institutional change in healthcare organisations show that profound institutional change is due to a multilevel shift from professional and political dominance to managed care. The institutional logic of professions is contested and replaced by the institutional logic of managed care.(25)

Institutional logic is defined by Thornton and Ocasio (26) as 'the socially constructed, historical pattern of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organise time and space, and provide meaning to their social reality' (p.804). Thornton and Ocasio follow Friedland and Alford's point of departure, whereby institutional logics are seen as organisational principles informing organisational members' behaviours.(23) The concept of institutional logic has proven to be fruitful for understanding institutional change.(25-29) An important assumption in the understanding of institutional logic is that interests, values, professional norms and identities are embedded in the competing institutional logics within an organisation. Decision behaviours result from how these interests, norms and identities are enabled or constrained by these institutional logics.(26)

Several studies within the IS literature have used the institutional logic approach (5,30,31) without addressing technology itself as an institutional logic. These studies have shown how different institutional logics such as managerialism and professionalism enact, blend, handle and create more or less IT affordance.(32,33)

We argue for digitalism, a new blend of institutional logic that has emerged in recent times with the introduction of large-scale ICT systems. ICT systems are more than external factors or adaptive elements to human actions; rather, they are embedded in organisations with their own logic, norms and values.

Understanding these systems in institutional terms enables us more fully to understand the processes and consequences of implementation. Instead of analysing institutional change as a result of a disruptive technology, whereby existing stable organisational fields are destabilised,(24, p.27) we assert that implementing ICT systems should be understood as processes of social restructuring that involve new actors, logics and systems of governance.

Digitalism has been introduced into research as a somewhat loose term for cultural changes in current society.(34) When we developed the term as a theoretical concept, we built on the discipline of IS. This research field was founded in the late 1980s, when scholars discovered that the effective use of information technology in organisations required not only working technology but also extensive knowledge of organisational dynamics and behaviours.(35) Today, IS research is a mature field and has a particular focus on how digital technology changes organisations and society.(36)

Digitalism has both practical and theoretical backgrounds. Theoretically, we base its concepts on key insights and beliefs in IS research, as follows:

- Digital technology is different from traditional technology in that it is flexible (can be tailored), scales economically (copies of software cost next to nothing) and is layered (each layer can be delivered by a different actor/vendor).(37)
- A successful solution is always socio-technical, i.e. the result of a planned or emergent interplay between people and technology.(38)
- Successful solutions balance local needs and global standards. Often, standardised solutions can serve a variety of organisations.(39)
- Large-scale solutions have a dynamic that is beyond the control of a single actor, making management challenging.(14)

Institutional analysis tends to emphasise one dominant logic and one institutional level, despite calls to account for all levels and prevailing institutional logics.(26) Of course, all studies have their limitations—so, too, does this study. The focus of this article is to analyse ICT systems as one of the prevailing institutional logics in hospitals, i.e. as an institutional logic in competition with other existing institutional logics, such as the bureaucratic and professional logics of the hospital.

Freidson (40) gives a systematic account of professionalism as the third logic in hospitals, in contrast with the free market and the bureaucracy. In professionalism, the autonomy of specialised workers is emphasised; in the free market, consumers dominate; while in bureaucracy, managers set the rules. Scott et al. (25) analysed market and bureaucracy as one logic—managerialism, in contrast with professionalism. Several authors have since argued for a hybrid of these and pointed out how these logics co-exists in public hospitals.(41–43)

We acknowledge their co-existence; although, for analytical purposes and to establish a theoretical framework to introduce digitalism, we analyse the competing logics by showing differences in a) actors

and agents, b) authoritative structure and distribution of power (regulation), c) responsibility and loyalty relations (norms and values), d) rationality and adaptation (cognition) and e) co-ordination (Table 2).

Table 2. The competing logics in healthcare organisations: professionalism, managerialism and digitalism

	Professionalism	Managerialism	Digitalism
Actors Agents and networks	Physicians, scientists, nurses, labour unions	Managers, leaders, bureaucrats, HR personnel	IT consultants, IT industry
Regulation Authority and distribution of power	Expertise, decentralised	Hierarchy, position, centralised	Self-regulated, distributed
Values Responsibility and loyalty	Individual responsibility, professional loyalty	Collective responsibility, organisational loyalty	System responsibility, project loyalty
Cognition Rationality and adaptation	Optimal	Limited	Adaptive, iterative, integrated
Co-ordination	Standardisation of skills, autonomy	Target management, organisational structure	Agile process organisation, layered models

(Source: inspired by Freidson,(40) Simon,(44) Gouldner,(45) Mintzberg (46))

Analysis

In order to discuss and illustrate the theoretical framework, we will use the case of OUH and the process of implementing DIPS followed by years of organisational inertia.

a) Actors – agents and networks

As shown by other studies, the different logics would have different agents and associated networks. (6,30,31) Professionalism is typically associated with physicians, scientists, nurses and other clinical personnel, as well as their dedicated labour unions. Managerialism is typically associated with managers, finance teams, administrative staff and HR personnel. Digitalism is practiced by the IT industry, IT vendors, consultancy firms and the IT departments of many organisations. This is a large and growing sector with a global turnover of 55 trillion dollars.(47) Digitalism shares a set of insights, beliefs and work practices that are taught in computer science and IS programmes at universities and practiced across millions of projects around the world. When working on projects, IT professionals regularly co-operate with professionals in the field (such as physicians during projects in the healthcare sector) and an organisation's project managers. IT professionals often view their role as mediating the many demands

of domain professionals (increasing costs) and the financial and temporal limitations set by managers. (48)

At OUH, a new group of IT actors has become more evident in processes of organisational change. The process of DIPS has clearly shown the importance and need for this type of personnel. One technology source said:

We have changed the procedure for organisational changes. [...] We have established routines so that all plans for restructuring must first be presented and commented upon by our ICT resource [a person competent with IT], and a specific impact assessment of whether the change will have an effect on the IT setup has to be performed in advance. [...] We changed how we organise our IT services. All IT resources were centralised. During the period of 2008 to 2012, IT became a strategic function in the hospital and added to the CEO staff.

The hospital is still discussing the role and position of this new type of personnel, but there is no doubt that they represent a new set of actors with new and important skills in healthcare organisations.

b) Regulation – authority and distribution of power

A well-known distinction in addressing different institutional logics is the definition of authority and system of regulation. Managerialism grants authority according to a person's position within a hierarchy. (49) 'The higher the rank, the higher the authority' is a central guiding principle for all bureaucratic organisations.(50) In contrast, management by profession, or professionalism, sees authority granted according to level of expertise and, more specifically, the weight of the best argument based on facts and science. In this way, the most knowledgeable employee would have the most authority, regardless of his or her position in a hierarchy.(51) In professionalism, it is not enough to ground a decision on coercion or instruction; it needs to be based on professional knowledge and expertise.(41) Digitalism takes a radically different perspective on regulation and authority, with the ideal situation being distributed authority and self-regulation. Digitalism sees no need for a centralised authority or even a need for authority. This perspective originates from the idea of how blockchain technology works: a system that controls itself. It has been used to illustrate IT governance as such.(52) Blockchain solves issues of regulation by distributing control across a network of users without the need for a centralised authority to ensure the continuity of the system.

At OUH, the implementation of the integrated ICT system resulted in a new IT governance systems that was, to some extent, both distributed and outsourced, according to one HR source:

Almost half of the IT staff was outsourced to NN [an external enterprise partner]. The day-to-day running of IT services was to be handled by NN. If there were troubles with the IT services, the employees were to contact them for help. The local IT department had only a strategic IT function, not the operational responsibility. [...] Members of the local strategic IT department have become experts at blaming NN by pointing out the faults and problems and addressing NN whenever problems arise.

Clinicians advocated the logic of professionalism during the process, and the distributions of authority and power were seen as decentralised in authority structures that followed clinical expertise. The introduction of DIPS provided examples of how professionalism can collide with the implementation of new ICT systems. A source told us how he had experienced clinicians establishing workaround routines in order to complete a task. They did not have patience for the inflexibility of the hospital's ICT system:

We are far back technologically. [...] Several doctors have told me that they use their own phones to take pictures of patients and pass these on to colleagues for expert comments. They say it is so cumbersome with the functionality of the established IT systems. [...] They bypass all routines and this, of course, breaks with all privacy legislation.

From a managerial perspective, as this source reflects, the structure of authority is centralised, and clinicians are expected to follow the rules no matter how cumbersome these are. The innovation mentioned above were not seen as legitimate, but the inflexibility of the ICT system was acknowledged.

Still, digitalism does not follow managerialism in the sense that authority is defined by positions within an organisation. It is true that the ICT system had been implemented from above with a centralised distribution of power, but IT experts define a solution and managers often do not have the competence to understand its logic or fundamental functionalities. This was reflected in the aforementioned established routines for organisational change at OUH, whereby an expert group was set up that consisted of IT personnel and DIPS experts to advise on solutions before organisational changes were decided.

c) Values – responsibility and loyalty

The next dimension addresses institutional values, which include views on responsibility and loyalty. The principle of professionalism holds that each professional individual has an individual responsibility.(40) Carrying out the profession of a doctor or nurse implies a personal responsibility, and the organisation is required to facilitate this responsibility. This is also the foundation and argument for autonomy within professions. From a managerialism perspective, however, the emphasis is on employees having a collective responsibility to fulfil the goals of the organisation, whereas managerialism expects loyalty to be linked to the organisation.(53) From a professionalism perspective, loyalty is primarily linked to field of expertise, ethics of the profession and professional global community—loyalty goes beyond organisational boundaries. Digitalism is primarily organised across agile projects whereby loyalty is a more volatile and ad hoc concept.(7) The possibilities, ethics and values are built into the system.

The previous quotation shows how clinicians bypassed the structures and demonstrated their lack of loyalty to the organisation as a result. It also showed how their actions promoted individual responsibility in a professionalism perspective, as they take individually initiative to solve the hindering. From a managerial perspective, the responsibility is collective, and the source therefore react to the actions taken. The adaptive and volatile loyalty of digitalism concerns the responsibility of integrating large-scale ICT systems to fit the whole organisation. The large-scale ICT system in question was implemented to standardise and integrate work processes, which contested clinicians' free choice of sequence in their

work assignments. Digitalism's institutional order can be observed in its effects on work processes. In theory, the effects of integration would not directly impact clinicians' work but, as explained, this was not the case in practice. Clinicians often postpone or rearrange assignments; however, DIPS did not allow assignments to change their order, as it was pre-set for ideal workflow and had its own requirements, according to one of our medical sources:

Clinicians do not realise that DIPS is changing work processes. Everything is more integrated. The work can no longer be done as separate assignments nor without proper documentation. The logic of DIPS assumes that the work is integrated with the units and follows how the work processes set up in DIPS. [...] The introduction of DIPS was something more than just introducing a new system. Digitisation connects work processes which were previously disconnected. Now the system requires everything to be more integrated, from the patient's entry, sampling, re-location to other departments, discharge and referral. [...] The implementation of DIPS showed us how all this had to be cleaned up and standardised.

This paradoxical relationship between the need for standardisation and the quest for autonomy in professionalism has been addressed by several other scholars.(54–57) The paradox is especially visible in day-to-day routines that promote standardisation and work practices that promote autonomy.(57) This was even more evident in our case, which introduced digitalism.

d) Cognition – rationality and adaptation

The cognitive dimension addresses optimal, adaptive and limited rationalities as different approaches to problems and solutions. In contrast with optimal rationality, Simon argued that it would be ineffective in an administrative context to present too many choices to a decision-maker.(44) Optimal rationality requires a costly and time-consuming search for best alternatives and would, in the end, be irrational. Decisions are thus better served with fewer alternatives.(58) The solution would be to settle with a 'good enough' decision. The organisation would provide the limits for the search according to how decision-making is structured, and the 'administrative man' would settle for solutions given by the limitations of the organisation. In contrast, professionalism seeks optimal rationality. Knowledge workers seek to increase their fields of expertise, and so their search for better solutions is global. Professionalism is, in a sense, 'anti-organisational', as it lacks respect for organisational boundaries. Professions take pride in breaking down boundaries and seeking new innovations. They typically see budget constraints as matters for negotiation, and they are not determined by finite resources. Digitalism, however, is based on a logic of adaptation that asks what the best fit for an action is in a given situation. Digitalism seeks to address the problems at hand and mirrors work processes, to be able to assist with or take over assignments in the organisation.

In contrast with the logic of professionalism, which seeks optimal solutions, and managerialism, which searches for 'good enough' solutions within the confines of an organisation, the logic of digitalism involves adaptation. The intention of ICT architects is to design systems that fit the activities of an organisation, as shown in the above quotation. The work assignments had been carefully mapped before the system had been developed, and the rationale was to find the system that best fitted the organisation.

However, this mapping does not always come out correctly. A technology source told us how the organisation needed to construct imaginary units in order to comply with system requirements:

DIPS has been developed primarily for small hospitals, and, therefore, it is problematic that it only relates to two levels of management. But that's not the main problem. DIPS requires a separate setup in the organisation. There were units we had to construct but do not exist in the organisation. […] We handled this by 'shading' the fictitious units. That is, the units thereby only exist hidden in the system. The clinicians do not have to deal with these units.

This 'shading' was a technical issue that was easily handled. Another example was even more interesting and profound. One source with a technical background seemed to blame the organisation rather than the new technology itself and regarded the organisation as redundant and old-fashioned. This source commented that DIPS presupposed a structural feature that did not exist in the organisation:

DIPS is structured in a way that follows the path of the patients. But the organisational structures in hospitals actually follow how the medical specialties are structured. This makes it very difficult for us to map the two systems together. It is as if DIPS has been made for the future, not for how the hospital is formally structured today.

The architects of DIPS had probably observed how the clinicians *actually* worked and based their design on how different clinical roles such as nurses, midwives and physicians would work together around the patient, and across different specialties in multidisciplinary teams. This would be the *de-facto*, albeit informal, organising of hospital work. However, the *de jure*, formal structure of a hospital is mainly sorted by medical specialties, and by this it differs from these multi-disciplinary teams.

e) Co-ordination

The final dimension addresses the principle of co-ordination. Proponents of managerialism believe that co-ordination is achieved by setting goals for an organisation and by the design of its formal structure. As managerialism presumes that decision-making behaviours follow a formal structure, this structure also sets out how an organisation is co-ordinated. Mintzberg illustrated differences in co-ordination using the way organisations are configured and showing how professional bureaucracy is, in contrast, co-ordinated through the standardisation of skills.(46) An HR source describes this as follows:

The warning lights should have started to blink when we first started to plan the implementation of DIPS. We were told that the entire organisation had to be frozen during implementation. This should have given us a clue that we were now introducing a very rigid system that required the organisation to be unchanged for a year.

The managers at OUH expect large-scale IT to be just as changeable as the organisational structure. However, this view is also reflected in the differences of belief in the importance of the formal structure as such. An HR source explained to us how they experienced differences in understanding how organisations work:

For IT people, organisation is just a pile of boxes. They do not see the big picture and what it is really about. Organisation is about processes and creating commando-lines that handle inconsistencies and shifting goals. This requires the structure to be able to change. […] The structure is not a stable system set once-and-for-all, as IT personnel seem to think. Oddly enough, this is also how clinicians seem to think about organisational structures. They look at structure as just simple boxes and do not see the possibilities. That is, they hate organisational change. The doctors relate to the organisational structure as only a status hierarchy and not as having a co-ordinating function for action.

This source speaks for managerialism. Their frustration from the lack of respect and knowledge of the formal structure as a tool for co-ordinated action is evident. More surprising was the mention of the lack of understanding among IT personnel. Professionalism and digitalism do not believe in, or do not emphasise, the co-ordinating effect of formal organisational structure, which can be perceived as hindering co-ordinated action, rather than supporting it.

Digitalism does not emphasise the organisational structure as having a co-ordinated effect, as seen in the case of OUH, because digitalism sees organisations as layers of systems and data. This layered perspective originates from the structure of ICT systems, which are typically designed with layers of hardware, network software, operating systems, domain systems, databases and user services. In the sub-discipline of enterprise architecture,(59) these technical layers are connected to the work processes of the organisation, as previously discussed in relation to DIPS. This illustrates how the value-creating processes are supported by digital technology (Table 3).

Table 3. Enterprise architecture for a hospital

Work processes: Referral -> Diagnosis -> Treatment -> Care -> Discharge					
Lightweight ICT	Apps	Apps	Apps	Apps	Apps
Heavyweight ICT	EHR	Radiology	Laboratory	Chart	PAS
Operating systems	Software foundation, operating systems and transmission				
Hardware	Hardware foundation, physical machinery and networks				

These layered models serve at the root of digitalism for two reasons. First, they represent the organisational view of ICT experts, which is distinct from that of clinicians and managers. This stands in contrast with the standardisation of skills and autonomy as the basis for co-ordination in professionalism (57) and with the formal organisation structure as the basis for co-ordination in managerialism. Second, the models guide ICT experts in the implementation and maintenance of systems. Since organisations focus on (generalised) work processes, digitalism exploits the scalability of digital technology to structure all units with the same heavyweight solutions.

There is, however, one way to mitigate the institutional impact of large systems according to digitalism. This is called 'lightweight ICT', which is positioned between heavyweight systems and work processes.

Studies of ICT system implementations have shown that it is useful to differentiate heavyweight ICT from lightweight ICT,(60) which are each conceptualised as different knowledge regimes. Heavyweight ICT denotes the large systems delivered by ICT departments all over the world—back-end solutions, such as ERP and other transaction systems. Heavyweight ICT is less visible and its impact is less known. Lightweight ICT is more familiar and its visible interface attempts to satisfy the simple and immediate needs of a user. Lightweight ICT typically supports work processes using simple applications and inexpensive technology. The most obvious example of this comes from the 'app-revolution', whereby small programs on handheld devices substitute heavyweight GUIs, for instance to retrieve information regarding the arrival of a bus or monitor heart rate from a wearer's smart watch. Lightweight ICT is often thought of as a set of tools and is what most people associate with ICT. Heavyweight ICT systems, by contrast, are embedded in organisations.

This distinction indicates two different institutional processes of change, whereby lightweight ICT supports innovation and change, and heavyweight ICT encourages stability and inertia. The health sector has been traditionally characterised by large systems dominated by heavyweight thinking; although, in recent years, there has been a wave of lightweight innovation in the e-health field, whereby solutions such as sensors, apps and tablets have become available. Typically, clinicians embrace lightweight ICT, while managers are more concerned with heavyweight ICT.

Discussion

Towards an understanding of digitalism as a new logic in healthcare organisations

The different logics do not appear isolated, although we argue for different carriers and advocates of these in the first dimension of our framework (Table 2). The mix of competing logics is especially evident in large-scale organisational change and large projects, such as reorganising OUH and implementing DIPS. It is in these meetings that we find these paradoxical effects and dysfunctionalities.

The second dimension in our framework raises the question, what would distribute power and authority in an organisation? The perspective of digitalism sees authority as distributed, albeit with the same emphasis on expertise as professionalism. Digitalism argues that technological competency is essential for development, as seen from our interviews, but authority and regulation could be distributed and self-regulated. However, when blended with managerialism, digitalism has a tendency to end up with a centralised authority due to the nature of large-scale systems.

The third dimension addresses institutional values; this includes views of responsibility and loyalty. Digitalism has a project based approach with a dedication and loyalty to the field of digital expertise. The loyalty is more volatile and flexible and the transition from project based to the permanent organisation causes difficulties (7) as was shown in the OUH case.

The fourth dimension addresses the different approaches to problems and solutions with the distinction of optimal, adaptive and limited rationalities. The logic of digitalism largely follows what is possible as a

logic of adaptation not as a search for the optimal solution but as a search for what is the most appropriate solution for the situation.(61) The result would be an integrated logic with the intent to mirror activities in the organisation through an agile iterative process.(62) The difficulty is, as was shown in our case of OUH, that actual workflow processes (de facto) are not reflected in the formal structure (de jure). Normally the formal structure has only a vague co-ordinating effect, but when ICT systems are designed digitalism presume that the formal structure actually represent how work is being performed. The gap between the de facto and de jure structures become more evident. Digitalism creates a link between managerialism and the formal structure and professionalism and the informal structure. Digitalism ends up of amplifying the dysfunctional formal structure of hospitals.

Managerialism believes in top-down and centralised regulation; thus, it embraces and argues for a monolithic and heavyweight system without understanding how these systems actually disable managerial control and co-ordination. Professionalism believes less in co-ordination through management and the organisational structure and emphasises work processes and standardisations of skills. Digitalism adapts this and follows the work processes of the hospital, albeit in a more standardised and less flexible manner than what professionalism would expect. The mix and the confrontation between logics has interesting adverse effects and increased complexity.

Conclusion

In this article, we propose a new type of profound institutional logic in public organisations called digitalism. Digitalism represents a new set of regulations, values, integrations and perspectives on the co-ordination of organisations. Introducing heavyweight systems, such as DIPS, has brought digitalism into healthcare organisations.

We have found that ICT systems have regulative, normative and cultural-cognitive elements that provide stability and meaning within healthcare organisations in several ways. Using Scott's terms,(24) we can briefly describe these as follows:

- Heavyweight systems are regulative, in the sense that they structure behaviour such as the work processes of clinical personnel.
- They are normative because they constrain the actions of organisational actors, such as our examples from OUH.
- They are also cognitive, in the sense that they contest the underlying understandings of problems and solutions held by clinical personnel and hospital administrators.

Understanding large-scale ICT systems as an institutional logic helps us to interpret the frictions of logics that were observed at OUH. The institutional logic of the hospital (for instance, the practice of changes in the organisation structure) collided with the logic of the heavyweight systems, which were characterised by stability and inertia once they had been installed and integrated.

What are the consequences of such a collision? First, clinical and administrative staff will be dissatisfied, and organisational actors (as well as external actors such as vendors) will struggle to understand why this friction occurs. Then organisational actors and external actors will try to negotiate solutions by trying to adjust the logics to harmonise their interactions.

In a similar discourse in the 1990s, enterprise systems research found that the logic of large systems should prevail over organisational practices.(63) The reason echoes new institutionalism: most industrial and commercial firms are basically doing the same things and should be structured in similar ways. Whether this argument applies to healthcare organisations is currently a much-discussed topic without clear answers.

What is clear, however, is that we can conceptualise ICT as a new institutional logic. This distinction has important implications for the acquisition and implementation of ICT systems in healthcare organisations. Since heavyweight systems are characterised by inertia, they should be used as structured repositories for large volumes of clinical and administrative information. At the macro level, healthcare organisations should accept the standards and best practices they bring. However, at the meso or micro level of work, processes and user practices, the institutional character of heavyweight systems harms organisational change and agility. Clinicians and managers will be able to deal better with ICT implementation by acknowledging digitalism and the importance of the institutional logics of heavyweight technology.

Declarations

Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethics approval was received from the Norwegian Centre for Research Data, application no. 59416 regarding the in-depth interviews. Informed consent to participate was obtained from all individual participants included in the study. The data were handled according to the Norwegian Personal Data Act, and they complied with the GDPR ethical requirements. Permission to access and use other data sources described in this study was given by Oslo University Hospital. These data is documented in a report and available upon request.(22)

Consent for publication

Not applicable.

Availability of data and materials

The data sets and documents used and / or analysed during the current study are available from the corresponding author on request.

Authors' contributions

LEK was the lead investigator and conducted the study as well as data gathering. LEK analysed, interpreted data, and wrote the first and successive versions of the article. BB advised on analyses, interpretation of data and contributed to critical revisions and writing of the article. We confirm that both authors have read and approved the final manuscript.

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