

# Structuration Theory and Conception-Reality Gaps: Addressing Cause and Effect of Implementation Outcomes in Health Care Information Systems

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## Abstract

*The implementation of health information systems is known to be complex and challenging. To facilitate the introduction of IS in health care, research should investigate the way IS affects human actions and organizational structures and the reasons it affects them that way. Studying the dynamic relationship between cause and effect could help make better design and implementation decisions to achieve desired outcomes. Two theories are presented to help investigate the 'what' and 'why' of implementation. Structuration theory introduces the notion of the interdependency between human actions and organizational structures. Heeks' theory of conception-reality gaps helps illuminate the causes of an implementation outcome. The two theories guide a case study of the implementation of health information systems in primary care clinics in Greece. The paper describes the two theories and how they may inform health care information systems research. It illustrates its points using examples from the field.*

## 1. Introduction

Organizational and social issues have been recognized as important determinants of the success of clinical information systems [1, 2]. Experience shows that technically good systems are not necessarily well introduced in health care settings. In fact, empirical evidence shows that 80% of failure that occurs in implementation efforts of health care information systems (HCIS) is due to social and organizational factors [3]. Despite these realizations, there has been very little reported research on organizational issues in medical informatics [4]. According to Sittig [5] an important challenge is to identify techniques that would facilitate the introduction of new technologies in health care organizations. Before developing such techniques, medical informatics research needs to investigate the following two questions: 1) In what way technology influences human actions and organizational structures;

and 2) why technology influences human actions and organizational structures this certain way.

The outcomes of implementation efforts depend on the particular context in which technology is introduced. Understanding the environment of clinical work will therefore facilitate the efficient implementation of a health care information system [4]. Consideration of the social context is often lacking in HCIS implementation. As Forsythe and Buchanan [6] describe: 'developers tend to think of systems as isolated technical objects they do not necessarily consider who will work with the system... how that work will be accomplished [and] the organizational contexts in which they are to be fielded'.

Research in medical informatics has traditionally provided sets of factors that affect the outcome of a HCIS implementation [7]. Less emphasis is given on the dynamic relationship between social and organizational factors and the outcome of implementation efforts in health care settings. The need for medical informatics research to make an ontological and epistemological leap towards a more interpretive approach has been frequently acknowledged [8-10]. Interpretive research is an emerging alternative tradition in information systems [11]. In contrast to the ontological beliefs of positivist researchers of an objective, external reality, the interpretive researcher views reality as a social construction of human actors [12]. Interpretive studies seek to understand the nature of the social world as a subjective experience. Human actions can only be understood within the organizational and social context in which they occur.

Acknowledging the need for rigorous organizational research in medical informatics and in particular on the dynamics between organizational factors and implementation outcomes, this paper draws on Giddens social theory of structuration and Heeks theory of conception-reality gaps. The two theories guide a case study of HCIS implementation in primary healthcare clinics on the Greek island of Crete. Structuration theory provides a way to bridge the dualism between objective and subjective views of the social world. It introduces the notion of dependency between human actions and structure in organizations. For medical informatics research is a

useful alternative to the traditional natural science approach. This research uses structuration theory as a meta-theory, a way to view the social world and its relation to human agents. It provides a framework to investigate in what way the introduction of HCIS influences human actions and organizational structures.

The second theory presented in this paper is based on Heeks writings on conception-reality gaps [13, 14]. The theory suggests that implementation success or failure depends on gaps between design conceptions and organizational realities. According to Heeks 'larger conception-reality gaps may bring greater risks of failure' as well as greater organizational benefits [14]. Preliminary fieldwork indicates that similar clinics differ in implementation experience and degree of adoption of HCIS. The theory of conception-reality gaps will help examine 'why' introducing a HCIS in similar organizational settings results in a varied degree of change.

Medical informatics research explores general factors that affect the implementation of HCIS. Linkage of influential factors to specific events within particular health care settings has not been thoroughly researched. In the current case study a research institution (production organization) implemented an HCIS in primary care clinics (customer organization). The clinics are all part of the public care sector and have similar structure and size. The implementation has not been a uniform experience among primary care clinics. Some clinics are using the system more than others. The production organization has used a general strategy for implementation addressing some of the most influential factors such as involvement of end users and training. These strategies did not produce the same results in all health care clinics. To facilitate the introduction of HCIS in health care settings it is important to explore the dynamic interplay between implementation decisions, outcomes of implementation, and individual characteristics of the organizational setting. The detailed investigation of linkages between cause and effect of implementation decisions sheds light to what factors are operational in specific situations and informs future implementation decisions in similar health care organizations. The research uses the theories of structuration and conception-reality gaps to guide the exploration of the dynamic relations between implementation decisions and outcomes. Each theory has strengths and limitations. Their combination reinforces their strengths to make them applicable in the health care context. In the following sections the theories of structuration and conception-reality gaps are presented followed by a brief description of the organizational setting in which the investigation is taking place. The last section of the paper presents how these theories inform the research of HCIS implementation efforts using examples from the field.

## 2. Structuration Theory

Anthony Giddens developed structuration theory as a general theory of social systems. In IS it has been used primarily for theory development and analysis of empirical case studies. This section will present the basic concepts of structuration theory used to inform the case study.

Since the early decades of this century the interplay between 'action' and 'structure' has shaped the development of organization analysis [16]. The majority of studies of innovation have either focused on structural characteristics of organizations or personal characteristics of the innovator [17] as determining factors of successful implementation. Recently, there is an increasing interest to 'address the complex and paradoxical relationship between action and structure' [18] and reject the notion of social structures as an objective reality separate of social interactions [17].

Giddens [19-22] developed structuration theory as an attempt to resolve the fundamental division in the social sciences between the naturalistic and interpretive tradition. Structuration theory offers an alternative view of social phenomena that incorporates both subjective and objective interpretations of the world. Giddens proposes a view of human agents and social structure as a mutually interacting duality instead of independent conflicting agents. Human agents produce, reproduce or modify social structures through their actions and in turn social structures enable or disable human actions. For example, in a healthcare setting, a doctor may start keeping detailed patient records when such 'structure' does not exist in the organization. Her action may create the momentum to enact a change in existing structures of the organization. If other doctors follow her action, keeping detailed records could become a new norm. As Giddens describes:

'In seeking to come to grips with problems of action and structure, structuration theory offers a conceptual scheme that allows one to understand how actors are at the same time the creators of social systems, yet created by them ... It is an attempt to provide the conceptual means of analysing the often delicate and subtle interlacing of reflexively organized action and institutional constraint' [22] p. 204.

Structuration is an ongoing process rather than a static property of social systems. Giddens uses the following terminology to illustrate his points [20]: *Structure* is the rules and resources that constitute the structural properties of social systems. *System* is the patterns of interaction between actors. *Structuration* refers to the conditions governing the continuity or transformation of structures, and therefore the reproduction of systems. Human agents use rules and resources, the properties of social systems, in their everyday interaction. Rules and resources mediate human actions and in their use they are continuously

reaffirmed or changed by human agents. According to Giddens 'rules of social life' are 'techniques or generalizable procedures applied in the enactment / reproduction of social practices. Awareness of social rules is the core of 'knowledgeability', which characterizes human agents.

Giddens conceptualises structure as 'a virtual order of transformative relations ... that exists, as time-space presence, only in its instantiations in practice and as memory traces orienting the conduct of knowledgeable human agents' [21]. A central premise in Giddens' theory is that human agents are purposeful, knowledgeable, reflexive and active. The word 'agent' implies purpose and power. An agent is able to intervene in the world, or refrain from intervention. An agent can 'make a difference' by exercising some power [21]. He notes: 'All social actors, all human beings are highly learned in respect of knowledge which they possess and apply, in the production and reproduction of day-to-day social encounters' [21]. Giddens distinguishes between two types of knowledge; discursive knowledge that can be articulated by agents and practical or tacit knowledge used in action but cannot be explicitly expressed. Reflexivity is another characteristic of human agents and it refers to the capacity of humans to routinely observe and understand what they are doing while they are doing it: 'every member of society must know ... a great deal about the workings of that society by virtue of his or her participation in it' [20]. However, knowledgeability of social actors does not imply perfect control of action. There are also unacknowledged conditions and unintended consequences of action [23]. Giddens notes that 'the production or constitution of society is a skilled accomplishment of its members, but one that does not take place under conditions that are either wholly intended or wholly comprehended by them' [24]. This realization implies that generalizations about social phenomena can only be temporally and spatially bounded [21].

Regular actions of knowledgeable and reflexive agents establish patterns of interaction that become standardized practices in organizations. Habitual use of standardized practices becomes institutionalised forming the structural properties of organizations.

Giddens provides a model for the dimensions of social change. He introduces the notion of episodes of change and suggests that the researcher should look at the origin of such an episode. The dimensions of change are presented in figure 1. Type indicates how extensive or intensive the change is: 'how profoundly a series of changes disrupts or reshapes an existing alignment of institutions'. Momentum refers to the rapidity at which change occurs, and trajectory defines the overall direction of change.

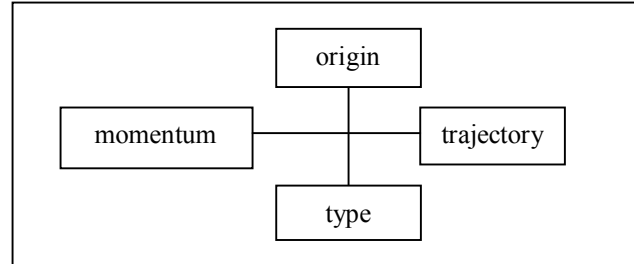


Figure 1. The dimensions of social change [21]

## 2.1. Structural research in IS field

Giddens' work on structuration is not directly connected to the study of IS but has received considerable attention from IS researchers [23]. In the following section some examples of how structuration theory has been used in IS research will be presented.

Structuration theory has been used in a number of IS research studies. There are two published reviews of the literature concerning IS and structuration theory: Walsham and Han [25] and Jones [23]. Walsham and Han analyze the literature under the headings of operational studies, its use as a meta-theory and the use of specific concepts from the theory. Jones classifies the uses of structuration theory in IS research into four main types [23]:

- 1) The modification of the theory to accommodate the construct of technology. Such examples are the development of adaptive structuration theory [26] and the structural model of technology [27].
- 2) The application of the theory to analyze IS cases and to explore the theory's strengths and limitations in empirical research.
- 3) Its use as a meta-theory, a general approach to look at actions, perceptions and structure and their interconnections.
- 4) A selection of Giddens' concepts in combination with newer theories such as actor-network theory [28] to guide IS research.

Barley [29, 30] has been among the first authors to address IS from a structural perspective. Barley used structuration theory to understand how the introduction of computed tomography (CT) scanners into radiology departments of two hospitals led to different social realities in the two similar environments. He investigated how the actions of the stakeholders and the institutionalized traditions within the organization influenced each other as 'occasions for structuring'. Orlikowski is one of the researchers who has used structuration theory to theorize aspects of the IS field. She has applied the theory in different IS contexts [31-34]. Besides applying structuration theory in research, Orlikowski used it as a starting point to develop the structural model of technology [27]. In her model she introduces the notion of the duality of technology. The *duality of technology* aims to

eliminate the dichotomy between the objective view of technology as ‘hardware’, equipment, machines, and instruments [29, 35] and the social view of technology. Technology has a physical component as a material artefact and a social component constituted of the different meanings actors attach to it and the features they emphasize and use.

Significant contribution to the use of structuration theory in IS research has come from Walsham and his colleagues. He has used structuration concepts to inform research in a variety of case studies analyzing the linkage between context and process of IS strategy, design, and policy development [28, 36, 37]. Walsham and Sahay [28] combine the informative character of structuration theory with the methodological component of actor-network theory to investigate problems in developing Geographical Information Systems in and Indian government department.

Little work has been done to operationalize structuration theory in the practical field of IS research. Giddens points out that his theory does not carry any particular methodological implications but ‘sensitizes’ the researcher to particular sets of concepts, such as the relationship between action and structure, which might otherwise be ignored. Structuration theory is useful in IS research to provide an informed account of social practices in a field dominated by technical considerations. Its sociological theorizing and analysis offers a rich understanding of social action that informs IS practice [38].

### 3. Heeks theory of Conception – Reality gaps

Heeks proposes the theory of conception-reality gaps to explain the occurrence of success and failure of health care information systems (HCIS) implementation. He places his arguments in the wider context of information age reform in the public sector. According to his theory success and failure of information reform depends on the extent of the mismatch between the conceptions and world-views of stakeholders involved in the development of the information system and public sector realities. An implementation effort that tends to match its environment in relation to technical, social and organizational factors will have greater possibilities of success. However, if the HCIS were to match exactly its environment no behavioural and operational changes would occur. The formal purpose of HCIS to improve health care organizations through change would not take place. The introduction of HCIS must bring some degree of positive change for organizational improvement to occur.

Conception-reality gaps explore the balance that exists between the dimensions of ‘current realities’ and ‘design conceptions’. The dimension of ‘current reality’ refers to the particular health care context that will accommodate

HCIS, also known as the customer organization. ‘Design conceptions’ refer to conceptions of the stakeholders involved in the design and implementation of the information system. They are represented in technology features and implementation decisions made by the production organization. Before expanding on conception-reality gaps it is important to elaborate on information systems role in a public sector reform initiative.

- Information systems are social systems embedded in a context of people and social structures.
- Information is the heart of all information systems.
- Information systems are introduced in a reform context that includes the organization within which IS will operate and the wider environment within which the organization functions. The organization has an organizational culture, a political dimension, a set of management strategies, and both formal and informal organizational structures. The environment has several components such as other institutions, political pressures, economic and market states and a variety of cultures and social systems. ‘All these factors have a bearing on the information system as well as on the broader process of reform’ [14].
- Information systems include information technology, information, people, processes and management. IS supports reform if it succeeds in all these areas. Reform where only the technology component works is similar to the old medical joke: ‘the surgical operation was a success, but unfortunately the patient died.’

It is important to understand that the introduction of an IS in an organizational setting is a complex process where several factors are operational. After a review of a number of case studies, Heeks concludes that mismatches between conceptions and reality can be classified into seven categories summarized by the ITPOSMO acronym. These categories are:

*Information*: information provided by the system versus user information needs.

*Technology*: technology requirements for system operation such as hardware and infrastructure.

*Process*: technology features in relation to existing processes.

*Objectives and values*: the accordance of objectives and values incorporated in the system in relation to objectives and values of users.

*Staffing and skills*: how well the system fits with human capability requirements.

*Management and structures*: how well the system fits within existing organizational structures.

*Other resources*: How available resources such as time and money match with required ones [14].

There are three archetypes of conception-reality gaps: rationality-reality gaps, private-public sector gaps, and country context gaps.

### 3.1. Rationality-reality gaps

Heeks distinguishes between two realities in an organization: the formal reality, which is dominated by rational models that assume logic, formality, and objectivity; and the behavioural reality that assumes factors such as human limitations, social objectives and subjectivity. When HCIS design is dominated by the objective, rational realities discussed below, a conflict may occur with the actual and perceived realities of health care stakeholders. Often, individuals are unable to distinguish between the dominant rational paradigms and what goes on in reality, that is, theory vs. practice [39]. Three common rationalities that guide HCIS design include technical, managerial, and medical:

- *Technical rationality.* Technology is conceived as an objective and rational entity without cultural or political value, and the design process is typically dominated by IT professionals [40, 41].
- *Managerial rationality.* Managers and external stakeholder groups such as shareholders or governments relate to legal, bureaucratic rationalities and financial realities. These realities, like technology, tend to be objective and rational. There is an increasing shift towards rational financial models via HCIS as part of the health care reform process [41, 42].
- *Medical rationality.* Medicine is also often conceived as an objective and rational entity where the focus lies on diseases and injuries, not patients [43]. When medical information dominates the design conceptions, HCIS tend to be designed as objective and rational entities.

According to Heeks, when there is a gap between rational and behavioural realities it might be attributed to individual differences, human cognitive or other limitations, or to differences in viewpoints. Successful design and implementation of HCIS should take into consideration potential mismatches in organizational realities. The information system as well as the implementation techniques should be context specific.

### 3.2. Private-public gaps

A central theme in government reform is the comparison of government to the private sector. Government would improve if only it behaved more like the private sector. These ideas often fail to address the mixed record of private sector organizations on both IT and non-IT issues, or fail to acknowledge how far private sector management practice needs to be improved [44]. Government is not a business. The public sector has typically broader objectives than the private sector. It encompasses social, political and economic factors in

contrast to the narrow financial focus typical of private organizations [45]. Public and private sector also differ in the degree of competition with other organizations. In the public sector competition tends to take place in the political arena [14]. Public sector tends to be much more tolerant than private sector towards the promotion of personal rather than organizational objectives, and the aversion to risk and innovation. Finally another fundamental difference between public and private sector is their understanding of customers. Private sector organizations tend to understand their customers in terms of what they buy while public sector organizations are concerned with every aspect of people's lives, their location, health, education, finances, criminal record, children, business activities etc [14]. Given these differences a system developed to address private sector needs maybe based on conceptions that do not match public sector realities. Often for example, public sector IS projects are larger and more complex than those in the private sector.

### 3.3. Country context gaps

Information systems developed in the context of a particular country may incorporate common assumptions of that context that are not necessarily applicable in other countries. For example, a patient information system developed in the US to support better health resource management faced difficulties when introduced in the UK. British nurses found the system hard to use because of the US-inspired assumptions it made about the planning and costing of patient care [39]. Even greater problems may occur when transferring technology from industrialized countries to developing countries. Often, systems developed in industrialized countries are based on design conceptions quite different from the organizational realities of developing countries. For example a system developed in an industrialized country may assume availability of Internet connections that do not match developing country realities.

## 4. The case study setting

On the island of Crete there are 17 rural primary care clinics called Health Centres (HCs). They operate as the first contact for the patient before going to the hospital. There are 196 Health Centres throughout Greece. The government founded the institution of Health Centres in 1981 as an attempt to decentralize health care from the large urban hospitals to locations close to the patient's home. Health Centres were founded to offer primary health care to their service population. They offer chronic illness care, ambulatory care, short hospitalisation, laboratory tests, and limited psychiatric services. Other services include practicing preventive medicine, performing health assessment of the population to inform medical action,

social care programs, and education opportunities for medical students and resident doctors. All HCs are similarly organized. They have a director, which is also a doctor, 2 general practitioners, a dentist, a microbiologist, a radiologist, a paediatrician, midwives, nurses, health visitors, and administrative personnel. The number of personnel varies between HCs. The introduction of HCIS in HCs was an initiative of the Centre for Medical Informatics & Health Telematics Applications (CMIHTA) at the Foundation of Research & Technology in Heraclion, Crete. CMIHTA is responsible for the introduction of HCIS throughout public healthcare institutions in Crete. The long-term objective of CMIHTA is the development of an integrated regional healthcare network and related added-value telematic services on the island of Crete as a pilot and a model for similar developments at a national and European level. The regional healthcare network is called HYGEIANet. The initiative is based upon the belief that HYGEIANet will strengthen healthcare in Crete guided by principles of universality, accessibility, comprehensiveness, portability and public administration.

Health care providers in HCs are the human agents that through their interactions and actions sustain the social structures that exist in a HC. Social structures refer to patient care in all its expressions: activities of medical personnel, rules that govern their interactions and storing of patient data. These social structures are shaped by human action within the HC as well as the formal authority that controls operations in the HC, namely the Ministry of Health. In public health care, formal authority exercises very little control on how HC operate. Formal rules exist but only in paper. Medical personnel have organized their work routines following self-organization within the financial boundaries set by the government. Each HC is organized slightly differently depending on the people that work in it and their interactions with each other and the environment. Some conditions that affect how HC operates is the managerial capacity of the director, the way he/she interacts with the employees, the interest of doctors in medical care, the collaborations among doctors in the HC, the collaborations of doctors with other health care professionals such as the lab technician, nurse or paediatrician. These are only a few issues that influence structures in the lack of formal rules and procedures. As a result of the individual character of each HC, the introduction of technology advanced in different degrees depending on the HC. This is explained by structuration theory, human action influences structures, each HC has different structures and different human actors therefore different experience upon the introduction of a technology.

The first step taken to tackle the research problem was to identify the production organizations, the customer organizations and their environments. The main

organization involved in the design and implementation of health information systems in Crete is the CMIHTA. The centre collaborates with the department of Social and Family Medicine at the Medical School of the University of Crete (FAMED) for the introduction of information systems at the primary care sector on the island of Crete. These two organizations are considered the production organizations. The environments they operate in are the public health care sector in Greek-Cretan culture.

## 5. Structuration theory and conception-reality gaps: a theoretical framework

Structuration theory describes in theoretical form what we observe in the practical world of a health care. Clinics are institutions where a number of actions are taking place every day. These actions are guided by a set of rules and resources available to the knowledgeable agents, the health care providers. These rules set the general schema in which health care providers take care of patients. Inherent to the health care profession are the autonomy of action and the uniqueness of patient cases. In an institution where there is such variability, rules are subject to modification and change according to the judgement of the health care provider. Structuration theory points out the dynamic relationship between human actions and institutional structure. So far medical informatics have treated health care in a rigid, structured format where computers are introduced in organizations to facilitate already existing practices. The highly individual nature of practice has not been extensively appreciated. Viewing structure and agency as a dynamic two-way relationship diverts the emphasis of traditional medical informatics research from static categories and structures at equilibrium to continuously changing realities [46]. The structuration process depends on the individuality of each organizational setting: the environment of the organization, the human agents that operate within it, and their interactions with structure. It also depends on the interaction of the organization with its general environment.

Health care is an organizational environment with unique characteristics. Doctors are faced with life and death situations. Ultimately, they set their own routines and procedures of how to deal with every day practice. In such a diverse environment the implementation of information systems becomes an especially complex process. General rules of how to accomplish a successful implementation need to be customized and adjusted according to the specific health care setting. Each implementation is based on experience and assumptions about the customer organization, which will accommodate the technology. To gain the relevant experience and inform implementation decisions, it is important to look closely at how the introduction of HCIS affects human actions and structures in the customer organization. Based on the assumptions of

structuration theory as shown in figure 2, the introduction of technology in a health care setting may alter institutional routines as well as individual routines. Structuration theory illustrates how human agents and structures are intertwined and influential of each other.

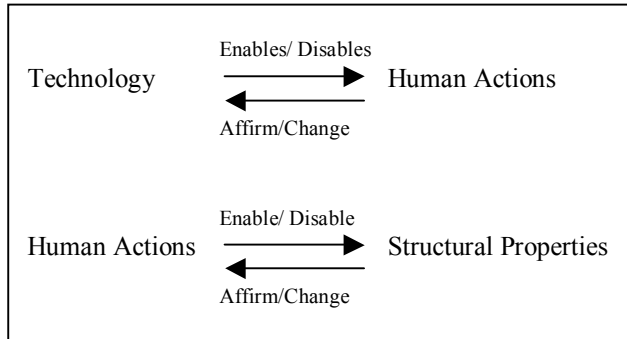


Figure 2. Interaction of Technology, Human Actions and Structural properties

Seen under the lens of structuration theory, health care providers are knowledgeable actors with emphasis on the many skills they use in everyday activity. Health care professionals are ‘highly learned’ individuals that know a great deal about the conditions and consequences of what they do in their day-to-day lives. In the Greek public sector, physicians experience a high level of autonomy and therefore, the potential of ‘making a difference’ by changing day-to-day practice. Medical professionals have a common goal, to take care of patients. In accordance with structuration theory, their actions are bounded by set structures such as available resources, medical equipment, number of staff, and rules such as keeping a schedule, recording basic patient information, being on call. In the mean time, physicians set their own routines of medical practice.

One example of the interdependence between structures and actions are the use of patient records. In HCs keeping detailed paper based patient records is not obligatory. The only formally required recording of patient information is writing in a ‘big book’ the name of patient, date and reason of visit and the action taken by the doctor. A big book exists in each medical office in the clinic. Recording patient data in the big book is considered the institutionalised structure common to all HCs. This structure has been modified in some HCs. Some doctors have established the routine of keeping paper-based records for their patients. The introduction of technology in an organizational setting may result in further changes in patterns of social interaction [17]. To look at how HCIS modifies social interactions, Giddens model of organizational change can be used (figure 1). Change has an origin, type, momentum and trajectory, our

characteristics that provide the boundaries of organizational change to facilitate its study [21].

Structuration theory provides a context for understanding technology structuring and human agency. However, Giddens has been critiqued for failing to address the effect of a dramatic and external shock to structure through an external factor like information systems. Giddens portrays the process of structuration in a rather static manner that spans over a wide range of stakeholder groups [30]. Within the health care field where multiple groups of professionals coexist, the assumption that structure is commonly shared between different groups, does not directly apply. Given the loose organization of public health care, it is not clear where one group's structure ends and another begins. Heeks’ theory of conception-reality gaps offers a potential alternative to complement some of the limitations of structuration theory. It accounts for the diversity of the health care environment and the sudden changes that are observed upon the introduction of an external structuring influence like HCIS. Typically most of IS types are formed within the boundaries of for-profit enterprises that contain more monolithic structures of control than found in health care.

Heeks’ theory addresses the question of why in different health centres the introduction of technology has resulted in different structuring. According to Heeks, the degree of organizational change that occurs in an organizational setting upon the introduction of a technology depends on the extent of the mismatch between ‘design conceptions’ and ‘current realities’. It is widely known that success or failure of an IS related change depend significantly on the conceptual models held by key stakeholders about the reform process [47, 48]. Gaps are not necessarily bad. They may influence the implementation process in favourable or unfavourable ways. Gaps between the ‘conceptions’ and ‘reality’ in relation to the technology exist among all those involved in the implementation of HCIS at different levels of aggregation: organization, group, and individual (figure 3). At the highest level of analysis gaps may exist between the conceptions and realities of the production organization and the customer organization (arrow a). In the present case study, the production organization is composed of two collaborators: the department of Social and Family Medicine at the University of Crete (FAMED) and the Centre for Medical Informatics and Health Telematics Applications (CMIHTA). Gaps may exist between their conceptions of the implementation process (arrow b). Each collaborator has independent relations with the customer organization. Gaps may exist in these relations that could affect the implementation process (arrow c). CMIHTA is the primary institution responsible for the implementation of HCIS in Health Centres, in the individual level it is composed of managers and technicians. They collaborate to accomplish the implementation of HCIS. Gaps may exist between managers and technicians (arrow d).

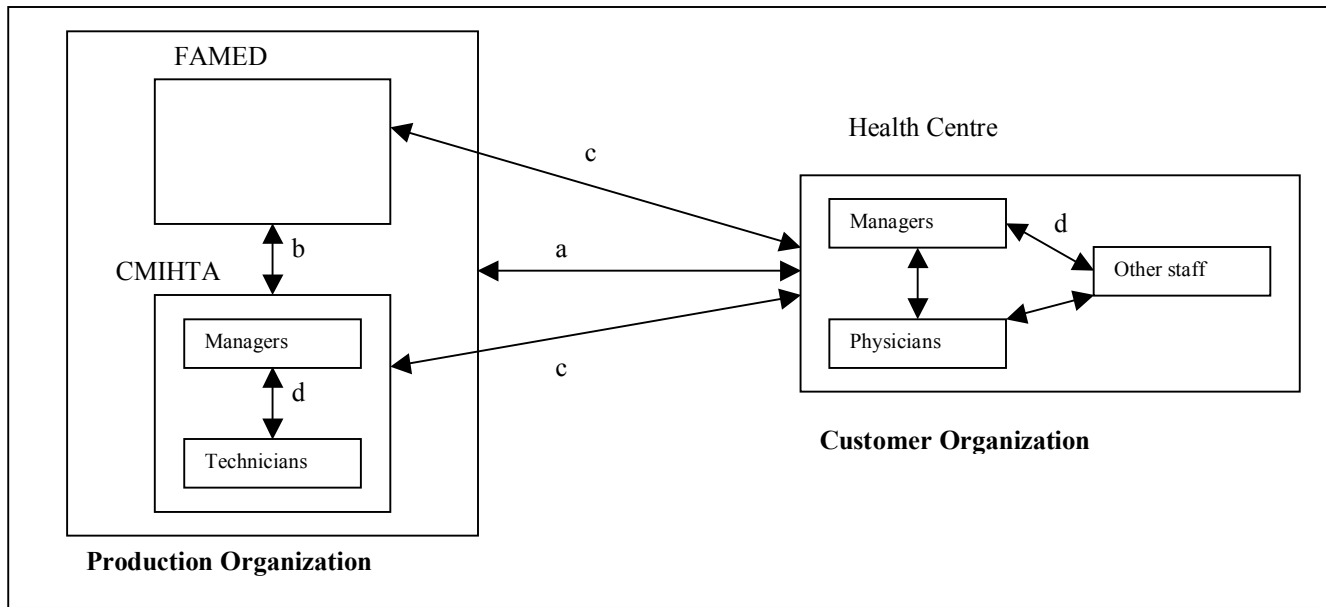


Figure 3. Levels of aggregation between production and customer organizations

The customer organization is composed at an individual level of managers, physicians and other staff. Gaps among these individuals may also affect the implementation process (arrow d).

Separating the gaps into different levels of aggregation helps their examination and classification. Studying conception-reality gaps in relation to how HCIS influences organizational structures and actions, sheds light to how gaps operate in different settings in relation to existing structures. A different combination to gaps in each HC may account for the observed variance in organizational change. It is necessary to identify the most successful combination of gaps to help guide future implementation initiatives.

## 6. Conclusions

This paper has presented elements of structuration theory and conception-reality gaps that guide a case study in Greek health care clinics. Structuration theory can be used as a meta-theory that accounts for the interactions that occur in health care contexts. It represents the continuous interaction between agency and structure. This theory suggests that the constitution of society is an accomplishment of its members without being wholly intended or wholly comprehended. This realization accounts for the complexity of social environments and implies that generalizations about social phenomena are temporally and spatially bounded. Structuration theory is used to address in what way the introduction of technology affects human actions and organizational structures. It is a theory with a rather static view of structures and does not account for the diversity of

professional groups within the boundaries of health care. To compliment its limitations, Heeks' theory of conception-reality gaps is used. It accounts for the sudden change upon the introduction of an external structuring force such as HCIS. It addresses the question of why implementation efforts of HCIS succeed or fail. It is important to study in combination what the influences of HCIS are in an organization and why so that causes can be linked to effects. Both could provide insight on how to facilitate future implementation efforts in the field of health care.

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