

**HEALTH INFORMATION SYSTEMS AND DEMOCRACY:
CONTRIBUTIONS FROM THE BRAZILIAN SANITARY MOVEMENT**

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ABSTRACT

Within the context of studies on Information and Communication Technologies for Development (ICT4D), earlier research has sought to understand how Health Information Systems (HIS) can achieve success in developing countries. In Brazil, in addition to these studies, research under the guise of Information and Information Technology in Health (IITH), developed within the context of the Brazilian Sanitary Movement, has also investigated how HIS can contribute to the development of health practices. IITH research seeks to understand how Health Information and Communication Technology (ICT) can enable the development of a democratic arena to improve health practices management in Brazil. This paper reviews the IITH literature in order to link its proposals with studies of HIS developed within the ICT4D realm. Thus, it was perceived that both theoretical approaches can be compared under six dimensions of analysis, namely: a) the need for a political approach to HIS analysis; b) the importance of integration standards for health information; c) the quest for research methods based on practical research; d) the need for a holistic approach to understand HIS implementation and use; e) the importance of local context settings; and f) the influence of technical artifacts on HIS. For each dimension, IITH and ICT4D contributions are compared and it is noted how similar they are in reality, as well as how they can learn and benefit from each other.

KEYWORDS: Health Information Systems; Information and Communication Technology for Development; Brazilian Sanitary Movement; Health Informatics; Brazil.

1. INTRODUCTION

During State reforms of the 1980s and 1990s, researchers – most of them from European universities – provided consulting services to governments and international organizations to implement information and communication technologies (ICT) projects in countries of the Global South. As a consequence of these activities, scientific literature began to circulate discussing how ICT might contribute to social and economic development, along with factors associated with the success or failure of ICT implementation in developing countries. Therefore, a research field called ICT4D was established.¹

According to reviews developed by Walsham and Sahay (2006) and Avgerou (2010), these studies have come to question whether ICT is really capable of promoting social and economic development in developing countries, while demonstrating the importance of considering local contexts, as well as featuring a wide range of theoretical and methodological perspectives.

The local context issues are especially addressed in research regarding health information systems (HIS) (Braa et al., 2004; Heeks et al., 1999). Such studies seek to understand how HIS can achieve success and improve healthcare in developing countries. Within this field, the Health Information Systems Project (HISP) stands out. This project

¹Reviews on ICT4D research can be found in Walsham and Sahay (2006) and Avgerou (2010).

started in Nigeria and for ten years developed HIS in various countries.² Other researchers have also made contributions to HIS in developing countries studies, such as Heeks et al. (1999), Smith et al. (2008), and Madon et al. (2010), among others.

However, in addition to the aforementioned studies, systematic research has been conducted in Brazil into how HIS can contribute to the development of health practices. Grouped under the nomenclature of Information and Information Technology in Health (IITH), these studies have been developed within the context of the Brazilian Sanitary Movement.³ Such studies tackle a technical and political dimension, seeking to construct a space in which Information in Health can contribute to an “emancipating democratic process for the Brazilian man and for the management and enhancement of health” (Moraes, 2002, p.11).

Although both theoretical perspectives – ICT4D and IITH – have drawn on similar issues regarding HIS in countries from the Global South, each of them has pursued its own path separately. Therefore, this essay intends to set forth how IITH can broaden the theoretical dimensions previously used in ICT4D studies.

IITH studies point to democratic means of health information production (Moraes, 2002), going beyond the effectiveness aspect of HIS, as proposed by the ICT4D approach. In order to produce health information in a democratic way, such studies propose a political approach to health information systems (Vasconcellos, Moraes and Cavalcante, 2002). Therefore, they address not only political alignment but also divergences and the resolution of controversies associated with HIS development. Moreover, IITH tries to understand how health information is produced via an array of practices comprising different interests, as well as spaces of discussion that influence the HIS outcomes.

In this respect, this work presents research developed in line with the IITH tenets, in order to compare it with the ICT4D tenets, seeking to identify research opportunities related to the joint use of IITH and ICT4D in the health informatics arena in Brazil.

This work is organized in the following manner. After this introduction, the second section gives an overview of HIS research under the ICT4D approach. The third section presents IITH studies, showing their contribution to the problematization of HIS in Brazil. The fourth section compares the two aforementioned perspectives. Lastly, concluding remarks are set forth in the final section.

2. HEALTH INFORMATION SYSTEMS IN THE ICT4D LITERATURE

In ICT4D literature, studies have sought to identify why HIS projects succeed or fail in countries in the Global South. These studies observe that most HIS projects in developing countries end in failure (see, for instance, Heeks et al., 1999 and Braa et al., 2004).

These failures are categorized as: (a) total failure, when the system is never implemented or is implemented but immediately abandoned; (b) partial failure, when major goals are not attained or when there are significant undesirable outcomes; (c) sustainability failure, when the initiative succeeds initially but fails after a year or so; and finally (d) replication failure, when the initiative succeeds in its pilot location but cannot be repeated

²According to Braa et al. (2004), HISP research has been conducted in South Africa, Mozambique, India, Tanzania, Ethiopia, Malawi, Mongolia, Cuba, Ethiopia, Nigeria, and China and has been published regularly since the 1990s (Braa et al., 2007; Braa and Hedberg, 2002; Braa et al., 2004; Kimaro, 2006; Kimaro and Nhampossa, 2005, 2007; Kossi et al., 2009; Sheikh and Braa, 2011).

³IITH research has received its main contributions from a research group based in the National School of Public Health at Oswaldo Cruz Foundation, which has developed studies since the 1980s (Moraes, 1994; Moraes, 2002; Moraes and Gomez, 2007; Moraes et al., 2013; Moraes and Vasconcellos, 2005; Moraes et al., 2009; Vasconcellos et al., 2002), though other research center scholars in Brazil are also engaged in this arena, such as (Facchini et al., 2005; Ferla, 2001); (Mello-Jorge et al., 2009; Moraes et al., 2013)

elsewhere, i.e. has no scalability (Braa et al., 2004; Heeks et al., 1999; Kimaro and Nhampossa, 2005; Sheikh and Braa, 2011).

Seeking to overcome HIS failures in developing countries, various works have addressed the factors associated with these results. Generally, such works, leaning toward social embeddedness discourse (Avgerou, 2010), reveal the influence of the local context of a developing country in HIS projects (Braa et al., 2007; Braa et al., 2004; Heeks et al., 1999). In the quest to understand the factors associated with the results of HIS, Heeks et al. (1999) attribute failures in the implementation of HIS to the existence of “conception-reality gaps.” In other words, rationality-reality, private-public, and country differences generate gaps that affect the implementation of the system.⁴

Starting with the issue of the local context and the sustainability of HIS, studies reveal the importance of establishing action networks that make HIS projects viable (Braa et al., 2004). These action networks are defined as those “intended to capture the dynamics of translating and aligning heterogeneous networks of routines, technology and learning within politically-contested terrains of opposing projects and ideologies, in an effort to promote sustainable, replicable changes” (Braa et al., 2004, p. 342). This network of heterogeneous actors is mobilized to support the system, as well as promote the sustainability of HIS, scalability (Braa et al., 2004), technical capabilities and learning (Kimaro and Nhampossa, 2005, 2007; Sheikh and Braa, 2011).

In addition to action networks, Kimaro and Nhampossa (2005) observe that HIS sustainability is associated with local resource capabilities. The technical capabilities aspect is also pointed out by Heeks et al. (1999), who associate HIS failures to gaps between the necessary abilities for using the system and the reality of the country.

Another factor associated with the implementation of successful HIS projects in developing countries is the construction of flexible standards for information sharing. According to Braa et al. (2007), HIS are developed to attend a range of local and national interests, therefore standards are necessary to integrate diverse existing HIS, as well as allow the inclusion of these systems in other places. To address this issue, they propose a flexible standards strategy for information sharing, whereby standards initially define a minimum data set that works as an attractor. By this means, these attractors induce the creation of action networks to support the implementation of HIS such that new standards are developed in an incremental way.

Moreover, studies on information sharing reveal the importance of different types of information (Smith et al., 2008), political and institutional alignment (Kossi et al., 2009; Sahay et al., 2009), and multiple – administrative, socio-political, and epidemiological – dimensions of health information (Smith et al., 2008).

Therefore, the literature on ICT4D contributes to the understanding of HIS, duly characterizing the results of HIS projects. In other words, success, failure, sustainability and scalability represent ways in which the results of HIS projects in developing countries can be measured as they are present in most of the works.

Effectiveness, depending on the scarcity of resources in developing countries, is an important dimension for analysis of HIS. However, it is necessary to consider how these HIS are contributing to the enhancement of health conditions in countries in the Global South, thereby demanding other dimensions for analysis.

Besides the predominant focus on effectiveness, studies on HIS in developing countries concentrate on projects and systems. However, the instrumental view of HIS, based on the integration of diverse information systems, can limit the understanding of same (Braa et al., 2007; Kossi et al., 2009; Sahay et al., 2009; Smith et al., 2008). For example in Brazil

⁴This perspective has been transposed to other settings beyond health ICT by Heeks (2002).

today there are more than 500 HIS in use (Brasil, 2011) and many forums where the HIS issues are discussed. Thus, a holistic view of ICT in health is necessary.

More recently, studies have highlighted the political facet of HIS. For example, the democratic accountability of HIS (Madon et al., 2010) and the political approach to HIS integration (Sahay et al., 2009) expands the ICT view beyond technology, involving social and epidemiological uses of information (Smith et al., 2008), problematizing HIS as a strategic space for political dispute.

As can be seen, the broadening of a theoretical ICT4D approach is a very much discussed topic. As Walsham and Sahay (2006) state: “future contributions could also be the other way, with IS researchers aiming to contribute to disciplines such as development studies, organizational studies, sociology, and anthropology.” This phenomenon has also occurred in the electronic government area, where there is “little use of frameworks of knowledge from governance,” “dominance of positivist research approaches, alongside absence of statements on research philosophy,” and “dominance of atheoretical approaches that simultaneously often fail to provide any significant practical recommendations” (Heeks and Bailour, 2007, p 260). Thompson (2008), for instance, defends the integration of development studies with Web 2.0 studies. When reviewing the ICT4D literature, Avgerou (2010, p. 12) observes that “we should work toward developing a theoretical basis for the analysis of the political economy and the sociology of ICT-enabled development.”

Based on the above, this essay proposes an approximation of the extant ICT4D literature with the IITH approach, described in the next section, in order to better understand HIS in Brazil.

3. HEALTH INFORMATION SYSTEMS IN THE BRAZILIAN SANITARY MOVEMENT LITERATURE

The history of HIS in Brazil is interlinked with the Brazilian Sanitary Movement,⁵ which arose in the 1970s when academics, workers and citizens launched a campaign for change in health practices, which at that time had social security-like characteristics, as well as management centralized within the federal government. At that time, the social security system excluded minorities, such as the unemployed, informal workers and the elderly, while centralized management did not take the local and regional realities into account.

The first HIS in Brazil appeared in the 1970s - the Mortality Information System (SIM) (Mello-Jorge et al., 2009). In the 1980s, in the context of the Brazilian social security system, a HIS was developed to control the billing submitted by health providers hired by the National Institute of Social Security (INAMPS) (Brasil, 2009; Moraes, 1994; Oliveira and Fleury, 1989).

The Sanitary Movement as a critic of the prevailing model at that time championed a political campaign for the universal right to health. This campaign, called the Brazilian Sanitary Reform, began to gather force at the VIII National Health Conference in 1986. Based on the motto “health for all,” the conference proposed health system reform in Brazil and laid the foundation for a new public health system, encompassing the universal right to health, public financing, administrative decentralization, and community participation (Conferência Nacional de Saúde, 1986).

The Sanitary Reform culminated with the institution of the Unified Health System (SUS), the current base of the Brazilian public health system. The Federal Constitution of 1988 (Brasil, 1988) established the right to health for all citizens, aiming to create a health system organized in line with the principles of decentralization, comprehensive care and

⁵The history of the Brazilian Sanitary Movement is recorded by Fleury (1997) and its propositions are set forth in Fleury (1989, 1997) and Campos, Merhy and Nunes (1989).

community participation, as well as leaving space for private health in a supplementary manner. Law 8080 of 1990 - the Organic Law of Health (Congresso Nacional do Brasil, 1990a) - sets forth the conditions for the promotion of health, whereas Law 8142 (Congresso Nacional do Brasil, 1990b), also of 1990, instated health councils and state and municipal health conferences. From this legal framework, the basic structure of the Brazilian health system was formed.⁶

Along with the SUS, the National Health Information System (SNIS) was established, the organization of which was ascribed to the Ministry of Health (MoH) in partnership with states and municipalities. To develop the SNIS, Datasus - the IT Department of SUS - was created in 1990 (Brasil, 1991), working under decentralized management, a basic tenet of the SUS. Datasus started orienting actions aiming to provide HIS at regional and local levels. Thus, Datasus began to produce HIS to support the actions of state and municipal health departments. In parallel, the private health sector continued to develop HIS to manage health insurance companies and providers. In other words, during the last 30 years many HIS were developed by actors in both public and private sectors to meet the demands of health planning and management. Because of that, recent attempts by the Ministry of Health aiming to construct an Electronic Health Record on a national level failed (Amora and Menezes, 2009; Gaspari, 2010) and HIS produced in Brazil remain fragmented (Moraes and Gomez, 2007).

The HIS issue was conducted within the Sanitary Movement by a research group that developed basic perspectives for Information and Information Technology in Health (IITH). Indeed, systematic studies about informational practices in health in Brazil have been developed since the 1980s.⁷ Furthermore, studies addressing IITH have been concerned with the democratization of social relations and the management and enhancement of health (Moraes, 2002), revealing a political and techno-scientific commitment of IITH based on the original assumption that:

“health information should be employed in a manner that reinforces human rights, that contributes to the eradication of misery and social inequalities while subsidizing the decision-making process in the field of health, in order to promote effective care and quality respecting the uniqueness of each individual and the context of each population” (Moraes, 2002, p. 12).

From this assumption, the studies seek to:

“reveal the genesis of the rationale that underpins the organization of Information in Health, running the risk of reducing it merely to its technical and operational aspects and thus diminishing its significance as part of the devices for the disciplinary power and the production of knowledge: the knowledge of a certain ‘watchful eye’ – the vigilant eye” (Moraes, 2002, p. 33).

Within this context, Moraes (1994, p. 54) calls into question the neutrality of HIS arguing that: “Information has a hint of secure neutrality; it is a large number of incontestable factors. Beneath this innocent aspect lies the initial point of a technocratic political agenda, which does not readily wish to expose its objectives.” Thus, studies in IITH support that the

⁶A broad description of the institutionalization and evolution process of SUS can be found in Brasil (2006) and Fleury (2009).

⁷Some examples of IITH studies are: (Facchini et al., 2005; Ferla, 2001; Moraes, 1994; Moraes, 2002; Moraes and Gomez, 2007; Moraes et al., 2013; Moraes and Vasconcellos, 2005; Moraes et al., 2009; Vasconcellos et al., 2002).

production of health information is not neutral, as it constitutes part of a political struggle for health and for rights to citizenship.

Thus, ICT can be used in a variety of ways, as Moraes (2002, p. 66) states: “Health Information Systems constitute the ‘technology of domination,’ but paradoxically can also constitute ‘technologies of freedom’: technology of power, but also of transformation.” Therefore, it can be postulated that HIS create a strategic space in which diverse interests are disputed.

Throughout this section, the main contributions of the literature on IITH developed under the Sanitary Movement are presented.

3.1 Fragmentation and Democratization of Access to Health Information Systems

Studies on IITH detected the HIS fragmentation problem in Brazil (Moraes, 1994; Moraes and Gomez, 2007). As already mentioned, in Brazil during the course of the past 30 years many HIS have been developed, and today there are various systems to cater to specific demands, such as birth control systems, mortality information systems, socioeconomic information systems, and information systems for disease control - tuberculosis, AIDS and hepatitis. Therefore, the lack of integration between systems results in inconsistencies in information, affecting adequate understanding of the health of the Brazilian population (Moraes and Gomez, 2007).

The fragmentation of HIS has been evident since the beginning of the 1990s when the first studies about HIS in Brazil were conducted. According to Moraes (1994, p. 11): “There is an accumulation of data and a diversity of meanings related to the word Information, thus the fragmentation of government decision-making is a reality” and the “fragmentation and pulverization of HIS in the country reflects and deepens the traditional dichotomy between preventive medicine and public health.” According to the author, this fragmentation is not a coincidence, as it is the result of the fragmentation of the Brazilian State and a set of diverse interests.

According to Moraes (2002, p. 67), health information within the current Brazilian context leads to “instruments, that, however technologically sophisticated, still adhere to the same rationale founded at the end of the eighteenth century.” In other words, health information, despite technological sophistication, represents and contributes to sustaining retrograde practices that have been perpetuated for centuries.

The situation has consequences for health practices and according to Moraes and Gomez (2007) current information practices in health limit the responsiveness of the Brazilian State vis-à-vis the population’s health problems.

Within the context of democratization of health information, Facchini et al. (2005) demonstrate the importance of SIST, a health information system developed for monitoring the economic active population’s health in Brazil. According to the authors, SIST allows for premature identification of problems in workers’ health conditions. With a focus on workers rather than on work diseases, Facchini et al. (2005) argue that SIST amplifies the understanding of the area, revealing further technical and training challenges to be overcome for its full utilization.

In the quest for a clearer understanding of health information, Vasconcellos et al. (2002) categorize three types of data sources: statistical information, administrative records, and transactional data. Statistical information comprises the set of socioeconomic information data on the Brazilian population. Administrative records encompass the necessary information for the operationalization of government actions, such as financial information. Finally, transactional data are related to electronic transactions associated with working processes in health

The three types of information arise from different sources and are often not integrated. Based upon this informational complexity, challenges present themselves such as “thinking of mechanisms that favor their appropriation by managers in the daily exercise of their function as decision makers, as well as the Board of Health and other representatives of organized civil society for the proper discharge of their functions of historical issues, committed to the advancement of democracy and improvement of the health of the Brazilian population ” (Vasconcellos et al., 2002, p. 225).

In order to respond to these questions, Vasconcellos et al. (2002) point to the importance of defining Standards of Information Sharing in Health, as well as developing an Information Environment for Health Decision Support encompassing all health practices in Brazil.

According to Vasconcellos et al. (2002), standards are fundamental for the integration of diverse HIS and the dissemination of knowledge about information of interest for health. Therefore “the existence of a national collegiate body is considered fundamental to discuss health information standards to be adopted in Brazil in a democratic and participatory manner” (Vasconcellos et al., 2002, p. 229).

Likewise, an Information Environment for Health Decision Support encompasses all sources of information, “constituting an alternative, among others in progress, for the development of instruments and mechanisms that enhance the capacity of governance related to the intensive use of ICT in health decisions, as well as supporting the timely definition of intervention priorities” (Vasconcellos et al., 2002, p. 230). In line with this argument, Ferla (2001) points to the importance of ICT tools for integrating information and health management support of decentralized health providers in regional health departments.

Moreover, Moraes (1994) and Moraes and Gomez (2007) maintain that the fragmentation of information, as a consequence of the fragmentation of the Brazilian State, serves the interests of the state apparatus and private businesses that wish to maintain the status-quo of informational practices in health.

According to Moraes and Gomez (2007, p. 557), this practice is interesting for companies, “as it broadens the possibilities of selling black box information systems solutions, whereby a similar product can be purchased by various consumers (organs, departments, sectors) with little expense in customization services.” Meanwhile, technical government agencies, as they have the knowledge about HIS, maintain their positions of power within the state apparatus.

Therefore, it becomes necessary to integrate health information with the participation of the informational subject, namely “an individual carrier of history, rights and duties, citizenship and subjectivity in response to the presence of fragments of the individual in the virtual reality of cyberspace” (Moraes and Gomez, 2007, p. 563). Thus, this subject – currently a mere source of information for governments – is supposed to become the center of healthcare. However,

“Strategies of diffusion of information broaden rather than democratize relations of power and production of knowledge implicit in their management, remaining in the hands of those who ‘understand,’ of those who ‘know,’ of those who are ‘experts,’ excluding social actors from the process of formulating State policies - a State as yet undemocratic in informational terms” (Moraes, 2002, p. 90).

In other words, a strict technical view leads health information to be discussed solely within the domain of IT experts, disregarding the population at large in this process. It is

therefore necessary for society to embark on a political struggle in order to attain democratic development of HIS and the dissemination of health information.

3.2 Public Policy on Information and Information Technology in Health

Research based on the Sanitary Movement approach proposes alternatives to overcome the fragmentation of HIS, as well as enact community participation in the development and usage of health information and HIS. Thus, the movement deviates from the paradigm that information and information technology in health is a strategic space where interests are in constant dispute.

In the early 1990s, upon detecting the need to construct an integrated approach to diverse sources of information, Moraes (1994) took the first steps towards establishing a National Policy on Health Information. As the author recounts, at that time a conservative approach prevailed, with the discussion of health information being reduced to the question of "what percentage of resources from the health budget is meant to be allocated to the computerization of systems?" (Moraes, 1994, p. 37). Obviously, this approach left the development of HIS to the whims of the market, ignoring the participation of society in the development of HIS and the management of health information.

Ten years later, it was observed that technical and operational difficulties in the collection of information were being resolved by new technologies of information and communication, thereby making the construction of ever more detailed databases about the lifestyles of the population possible (Moraes, 2002).

Meanwhile, based upon the perspective of the Foucauldian power/knowledge binomial, Moraes (2002) problematized the uncritical use of ICT in health. She analyzed how information in health is a means for population control, manifested in society in subtle ways, and argued for the need to "think about political, technical, and ethical proposals and a more democratic control over them, in which society places limits upon State control devices upon society." (Moraes, 2002, p. 32).

Moraes (2002) observes the existence of a movement within Brazilian society calling for the democratization of health information. Thus, she proposes a political struggle based upon the principles of emancipation and of participatory democracy, aiming at the construction of an informational citizenship. Therefore, Moraes (2002, p. 89) proposes a horizon for this political struggle:

"The situation is as follows: the State has the right to ask individuals about the different facets of the human dimension [...] and the individual has the duty to respond. The overall proposal (or synthesized proposal) is to reverse that formula, which then becomes the duty of the State to inform the public and the citizen, and the latter have the right to be informed, to ask the State and to participate in the process of formulation of the questions that the State asks."

This vision of public policy is reinforced by Vasconcellos et al. (2002). These authors argue that in the first few years after the turn of the twenty-first century, information and communication technology was not part of the discussion of the National Health Policy, namely the core strategy of the Brazilian health system. As a result, they redeem the importance of a strategic discussion regarding information management and ICT development in health (Vasconcellos et al., 2002).

Moraes and Vasconcellos (2005, p. 97) place the challenge in "amplifying the use of information in the everyday decisive process of health, be it in the formulation of policies, in management, in oversight, in clinics, be it in social control, facing inequalities of access to the benefits of technological advancement." Thus, they proceed to point toward a path for the

formation of a national covenant surrounding the theme of information and ICT in health, calling for a National Conference on Health Informatics and Communication (CNIIS). A conference that would bring together all the interests of society, in order to enable the expanded use of health information for the benefit of the Brazilian population.

The perspective of a public policy of information and communication technology was reinforced by the approval of the National Policy on Information and Information Technology in Health (PNIIS) at the 12th. National Health Conference (Brasil, 2004). By being approved at the National Health Conference, the PNIIS acquired the status of a legal framework in the National Health Policy. Moreover, it charted a long-term strategic vision and defined attributes for the different entities of the Brazilian federation and civil society, aiming at the construction of an informational reality in the field of health.

However, in 2013, more than eight years since the publication of the PNIIS, very little progress has been made. Of the 19 strategic action proposals, many of them never got beyond the drawing board stage. Due to this, the Sanitary Movement began to search for new ways of constructing a space for discussion about health information.

3.3 Information and the Information Technology Interfield

In an effort to consolidate the set of information on the topic of health, Moraes and Gomez (2007) transcend the vision of a policy for health information systems, proposing the construction of a political-epistemological interfield that encompasses the various HIS and the production of information in the field. In the words of the authors, the proposal was for:

“an ‘information and information technology interfield’ in order to put forth a manifesto that considers actors, practices, procedures, and knowledge that cross over as well as penetrate other ‘fields,’ which have already constituted differentiated criteria of identity and value within common health references, as they challenge and cross zones of intersection that exist in the interstices of different fields, which today seem to describe the complex and segmented facets of science and action in health” (Moraes and Gomez, 2007, p. 560).

As shown in Figure 1, the information and information technology interfield integrates HIS, from assistance to planning and management. In other words, health information is embedded in health practices that comprise, for example: a) the work of physicians, nurses and surveillance agents who record the clinical information; b) the epidemiological instances that assemble such information with demographic data for population health management; and c) administrative instances that link health information with the budget for planning and monitoring health actions. As depicted in Figure 1, each instance has its own information system (IITH box) to support its health practices.

Based on this perspective, health information generated in this interfield is comprised of various kinds of information related to health, namely: administrative, financial, and clinical information, in both public and supplementary health domains. This interfield is supposed to integrate all sources of data in order to give information for clinical practice – in professional/patient relations – planning and management actions, as well as community control and participation in the public policies regarding health issues (Moraes and Gomez, 2007, p. 561).

Furthermore, this interfield encompasses the three sources of data described by Vasconcellos et al. (2002) – statistical information, administrative records, and transactional data, thereby defining an integral field of health information, in which the informational subject is the center of action.

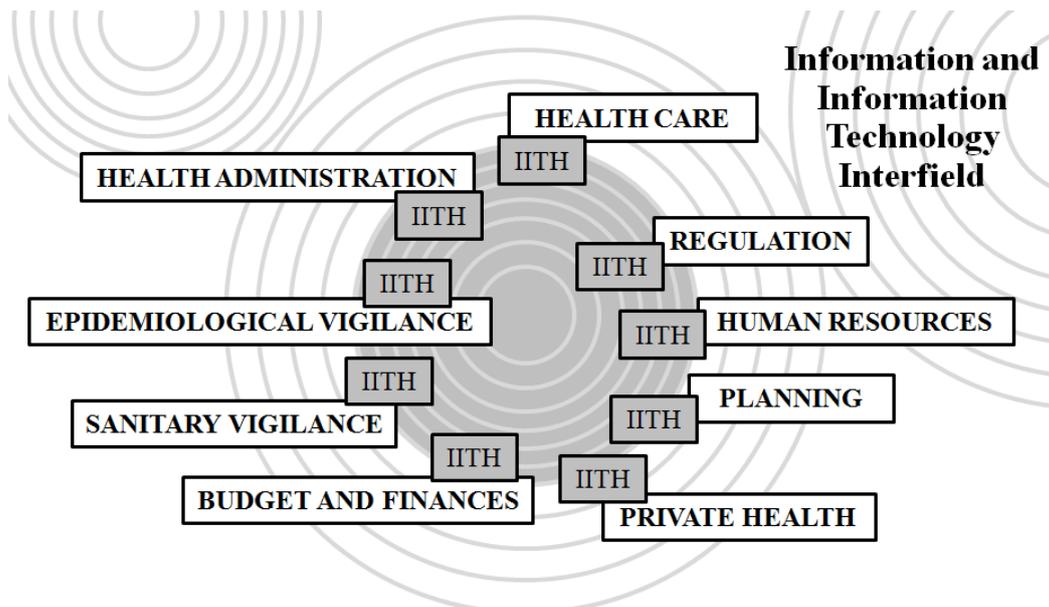


Figure 1 - Information and Information Technology Interfield. Source: Moraes and Gomez (2007, p. 561).

Based on the concept of the information and information technology interfield, Moraes and Gomez (2007) outline the spaces for discussion of health information production (Figure 2) involving public and private actors and comprising: a) health lifestyles; b) government and public administration; c) economic enterprises and private business, and d) science and technology in health and health information (Moraes and Gomez, 2007, p. 563).

Health lifestyles comprise the day-to-day instances of health information production and usage, such as local citizen associations, local non-governmental organizations, health councils, and other entities of civil society. These entities produce and use information regarding health education, prevention, surveillance, as well as for discussion and monitoring of public policies. Besides, government and public administration work with health information at the municipal, regional and national levels for various purposes such as epidemiologic and budgetary management of health actions. Moreover, the economic enterprises and private business encompass producers of goods and services of ICT, which offer systems, infrastructures and services for public and private actors. They are interested in exploiting and producing market opportunities for their technologies. Finally, science and technology in health and information include education and research in health and informatics in health, involving public and private universities and research institutes that pursue the development of technologies for health information, as well as utilize such information in academic research concerning health issues. These spaces are interrelated and through them informational *praxis* in health can be discussed.

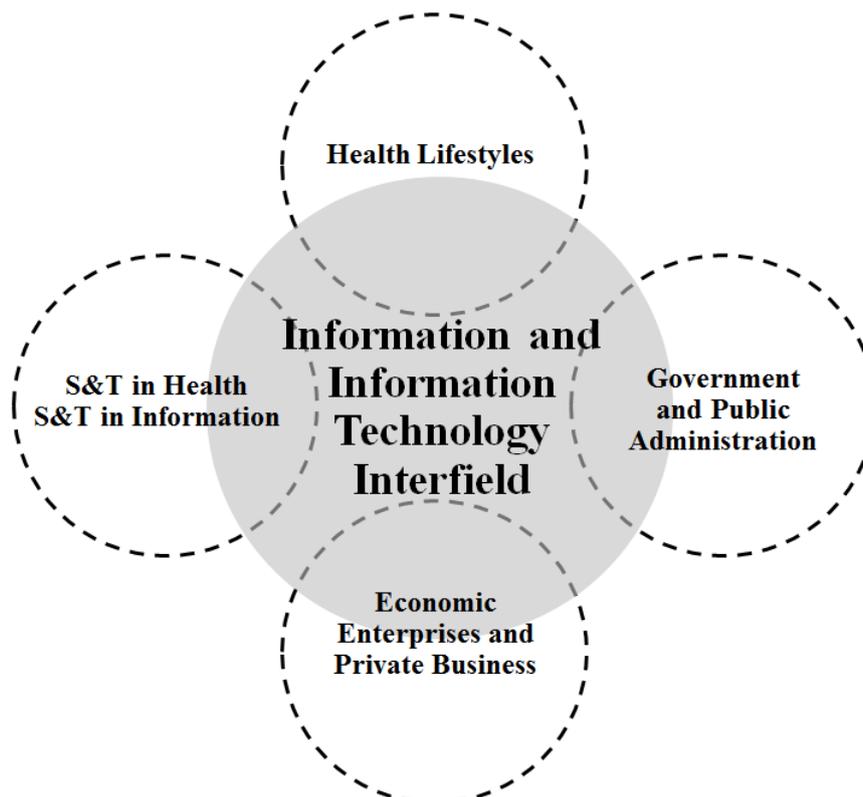


Figure 2 - Spaces in the Information and Information Technology Interfield. Source: Adapted from Moraes and Gomez (2007, p. 562).

Based on the discussion spaces, Moraes et al. (2009) analyze the utilization of information in the context of health councils and instances of social participation in the Brazilian health system, showing how information and information technology become mechanisms of power in the hands of managers in instances of popular participation. The authors, therefore, advocate the democratization of information, seeking to reduce the asymmetry between managers and the population.

Moreover, Moraes et al. (2013) assess the importance of decentralization of the Inter-Agency Health Information Network, called RIPSAs, for the discussion and agreement of regional health indicators. These discussions involve actors from local and regional levels in the production and analysis of health information, i.e. local professionals who register health data and public health managers and the community who analyze health indicators accrued from such data to develop public health policies.

Considering the systemic vision of information and information technology in health, other interrelated areas such as health education are also discussed in these studies. Cavalcante and Vasconcellos (2007) illustrate the possibilities of incorporating ICT in health education, while they also appoint political resources for change in the incorporation of information technologies within the field. The authors point out that ICT can provide an innovative technological base for health teaching-learning, favoring sharing of content, interdisciplinary approaches and training of professionals for the Unified Health System (SUS) on a large scale (Cavalcante and Vasconcellos, 2007, p. 614).

There are some other studies on these perspectives examining ambiguous implications of health information systems (Albuquerque et al., 2011), the usage of integrated information for management of decentralized networks of health services (Ferla, 2001), and information about workers (Facchini et al., 2005).

As cited previously, in Brazil there are many HIS, as well as many actors and spaces where the development of HIS and related questions are discussed, such as: a) the

Intersectorial Commission of Health Communication and Information (CICIS) (Brasil, 1998); b) the Inter–Agency Health Information Network (RIPSA) (Brasil, 2002); c) the Committee for Standardization of Information from Private Health Insurance and Plans (COPISS) (Brasil, 2006); and d) the Committee for Information and Information Technology in Health (CIINFO) (Brasil, 2009). These forums reflect the complexity of the Brazilian health system, which has many actors from the public and private sectors. It is therefore mandatory to understand such spaces and how they are shaping ICT in health in Brazil. In this respect the information and information technology interfield (Moraes and Gomez, 2007) might help to understand this complex scenario.

Moreover, the vision of the information and information technology interfield is important as it is related to the sundry actors involved in the health information field – politicians, bureaucrats and civil society – associating them with the results accrued from the discussions. Therefore, the interfield establishes parameters for analysis of the political struggle around information technology and its results, namely HIS, standards, processes, etc. The main tenets of the IITH approach can be consolidated in Table 1 below.

Description	Source
Information, democracy and development: Information is a right of the citizen and the State has a duty to disseminate health information.	Vasconcellos et al. (2002); Moraes (2002); Moraes and Vasconcellos (2005).
Fragmentation: The fragmentation of the State leads to the fragmentation of the HIS and limits the State's response to the demands of society.	Moraes (1994); Moraes and Gomez (2007).
Public Policy: ICT in health arise from a public policy that aims to provide technologies for use of health information.	Vasconcellos et al. (2002); Moraes (2002); Moraes and Vasconcellos (2005).
Information and Information Technology Interfield: The existence of a political-epistemological interfield that covers informational health practices is required.	Moraes and Gomez (2007).
Spaces for discussion: The political-epistemological interfield includes spaces for discussion on information in health.	Moraes and Gomez (2007); Moraes et al. (2009); Moraes et al. (2013).

Table 1 - Concepts from the Information and Information Technology in Health Literature. Source: Authors.

Interestingly, some of the concepts can be associated with other dimensions revealed in previous studies conducted in the ICT4D realm. Hence, the next section compares how HIS is analyzed by the ICT4D and IITH approaches, revealing points of convergence, as well as some complementary concepts that arise from this comparison.

4. COMPARING IITHAND ICT4D APPROACHES TO HEALTH INFORMATION SYSTEMS ANALYSIS

HIS studies on ICT4D are usually focused on the effectiveness of these systems, analyzing their success or failure (Heeks et al., 1999), sustainability (Braa et al., 2004; Kimaro and Nhampossa, 2005, 2007), and scalability (Braa et al., 2007).

Conversely, the IITH approach supports that health ICT is embedded in an arena of political dispute (Moraes, 2002). Consequently, sundry interests come into conflict, making it necessary to demystify the technical nature of ICT and transfer it to the field of social issues.

IITH studies contend that in this manner it will be possible to develop health information and communication technology for the benefit of the Brazilian population.

It can be said that the principal contributions of the theoretical perspective on Information and Information Technology in Health (IITH), which analyzes health information systems beyond efficiency and effectiveness, include dimensions such as the democratic production of information, the positioning of sectors of society in the discussion, and the transformation of health practices. However, in the ICT4D arena, Madon et al. (2010) support that theoretical perspective, by showing evidence of a democratic accountability dimension in HIS development and use.

Besides, the need to integrate HIS has also been discussed in ICT4D studies recently. The concepts of flexible standards for information sharing (Braa et al., 2007), a data warehouse approach (Kossi et al., 2009), political alignment (Sahay et al., 2009) and ways for achieving information integration and HIS scalability have been assessed. Interestingly, standards for information sharing have also been studied in the IITH literature since the beginning of the 1990s. IITH studies diagnose the linkage between HIS fragmentation and Brazilian State sectorial thought regarding public health issues (Moraes, 1994). Moreover, IITH proposes a national space for discussion of health information standards (Vasconcellos et al., 2002), as well as regional instances for establishing health information standards (Moraes et al., 2013). In this case, unlike the ICT4D approach, which proposes an emerging flexible standards strategy (Braa et al., 2007), IITH studies seek the constitution of collegiate instances for the discussion of standards (Vasconcellos et al., 2002), which are closely linked to the structure of the Brazilian health system that is strongly based on social participation.

Thus, both perspectives could profit from each other via a debate regarding the emerging top-down and effectiveness-based perspective of ICT4D and the consensus-based approach of IITH. In other words, the democratic approach of IITH can be linked to ICT4D research to address community participation and democratic outcomes associated with HIS development.

Besides, ICT4D studies recommend researcher engagement through action research (Walsham and Sahay, 2006), which have been conducted in HIS studies in developing countries for a long time (Braa and Hedberg, 2002; Braa et al., 2004). In the IITH literature, as already mentioned, there is also an explicit engagement with practice via political and technical/scientific proposals. This engagement has been seen through active participation in National Health Conferences, construction of Policy on Information and Information Technology in Health (PNIIS) (Moraes, 2002; Moraes and Vasconcellos, 2005), and joint activity with health councils (Moraes et al., 2009). Therefore, studies from both ICT4D and IITH enforce the importance of applied research to understand how to develop HIS in developing countries.

Walsham and Sahay (2006) stress the importance of conducting holistic studies at sectorial or national levels of analysis, regarding large-scale government systems. The IITH literature, through the information and information technology interfield (Moraes and Gomez, 2007), has already proposed an integrative approach to HIS analysis. This interfield resembles the networks of action proposed by Braa et al. (2004). On the one hand, networks of action present more fluid characteristics, mainly based on concepts accrued from the Actor-Network Theory (2005). On the other hand, the Information and Information Technology in Health Interfield, based on a critical structuralist perspective, proposes structured spaces of discussion. Thus, there is again space for the integration of both perspectives.

For Avgerou (2010, p. 11): “established categories, such as nations, industries, and formal organizations, which are taken as ‘context’ in most ICTD research, may not, on their own, provide appropriate framing for understanding the ideas and actions that constitute

incidents of ICT innovation,” thus arguing that “theory is needed to identify what is relevant context for each case of ICT innovation, and how it matters.” Studies in IITH advance in this respect, since after a critical reflection on ICT in health in Brazil, they propose an information and information technology interfield (Moraes and Gomez, 2007), a national policy on information and ICT in health (Moraes and Vasconcellos, 2005), as well as instances for health information discussion at national (Vasconcellos et al., 2002) and regional levels (Moraes et al., 2013). It can be stressed that IITH does not emphasize ICT itself, but rather the production and use of information, showing concern about the effects of ICT in health in society, as well as linking the various actors associated with the informational health praxis.

Moreover, research in ICT4D produced several studies about technical artifacts in developing countries, for example, health information systems (Braa et al., 2004), technological infrastructures (Ciborra and Hanseth, 1998), financial systems (Heeks and Bailour, 2007), etc. There are also studies addressing Brazil, such as: internet governance (Adachi, 2011), national policy on informatics (Marques, 2004; Ramos, 2009), digital inclusion (Teles and Joia, 2011), and geographical information systems (Rajão and Vurdubakis, 2013). Stemming most of the time from perspectives such as the Actor-Network Theory (Akrich, 1992; Callon, 1986; Latour, 1987, 2005), these studies for example identify that technical artifacts “represent a large set of technically delegated prescriptions addressed by the innovator to the user” (Akrich, 1992, p. 211). Yet, ICT4D studies discuss how HIS represent the view of countries of the Global North, a view that is disseminated in developing countries. Thus, it is necessary to intensify the understanding of how HIS might build different visions involved in this strategic dispute (Moraes and Gomez, 2007), integrating IITH studies with ICT4D ones.

Thus, in a consolidated manner, it can be perceived that both theoretical approaches can be compared under six dimensions of analysis, namely: a) the need for a political approach to HIS analysis; b) the importance of integration standards for health information; c) the quest for research methods based on practical research; d) the need for a holistic approach to understand HIS implementation and use; e) the importance of local context settings; and f) the influence of technical artifacts on HIS. For each dimension, IITH and ICT4D contributions were compared and it was discussed how close they are in fact, as well as how they can learn and benefit from each other.

5. CONCLUDING REMARKS

This essay reviews the literature on Information and Information Technology in Health in the context of the Brazilian Sanitary Movement, which has contributed to the understanding of Health Information Systems development, implementation and use in Brazil. It also sought to promote a debate between the IITH and ICT4D arenas, as both theoretical perspectives reveal similar problems but, until now, they have not profited from each other’s findings.

As already pointed out, HIS research in the ICT4D context embodies a more operational focus, analyzing the success and the maintenance of HIS in the Global South. Conversely, the literature on IITH raises questions about the democratization of HIS and about the political struggle associated with the dissemination of health information. Therefore, it problematizes the fragmentation of HIS and contextualizes the political-epistemological interfield of information and information technology in health.

It is important to point out that ICT4D and IITH have convergent approaches, namely standards for information sharing, engagement with social transformation, as well as the information and information technology interfield and networks of actors. IITH can also help ICT4D with the political problematization of information in health. On the other hand,

ICT4D can contribute to IITH by showing that technical artifacts actively influence healthcare practices.

As already stated, the broadening of theoretic markers is an important issue in the ICT4D realm. Walsham and Sahay argue for (2006, p. 14) “locally based research being reported on more widely in the future.” In Brazil, these works have taken place for years, although they have not been presented in ICT4D forums. Moreover, Pozzebon et al. (2011) argue on the importance of building an IS research community based on a Brazilian perspective. This community could discuss theoretical questions regarding local issues, notwithstanding being linked to other knowledge centers worldwide. This essay, then, moves in this direction, proposing the integration of IITH and ICT4D knowledge fields for a better understanding of HIS in Brazil and other countries in the Global South.

Although this work focuses on health, studies using IITH tenets can also be applied to other contexts. The fragmentation of information systems is not only a problem in health, as it is also observed in education, welfare, the labor market, etc. Moreover, the proposal for an informational democracy permeates all sectors of Brazilian society.

In conclusion, the concepts presented here have paved the way for a future series of studies seeking to analyze the results accrued from HIS deployment in developing countries, as well as investigating the factors associated with the outcomes arising from them. Therefore, it is to be hoped that future studies will pinpoint existing contradictions in the process of ICT development and use for health in the Global South, while laying the foundations for necessary changes, aiming to develop health informatics to benefit the health of the entire population.

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