

The Social and Political Concern of the Development and Use of Information Technology in Organizations: A Critical Systems Thinking Perspective*

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Resumen: *Este artículo explora el desarrollo de las tecnologías de la información (IT) en las organizaciones desde el punto de vista del enfoque de sistemas duro y blando y de pensamiento crítico de sistemas, respectivamente. Son también objeto de análisis el papel de las IT en las organizaciones y sus interacciones sociales y técnicas. El artículo intenta fundamentalmente elaborar una mirada al análisis tradicional de los sistemas computacionales desde una aproximación de sistemas duros, tal como ha sido ampliamente aplicada con miras a contribuir al desarrollo de las IT en las organizaciones. Luego, se discute la contribución del enfoque blando, que presenta un punto de vista fundamentalmente diferente de la acción humana. Finalmente, se presenta el nuevo enfoque: el pensamiento crítico de sistemas, y se discute cómo esta aproximación puede enriquecer el desarrollo de las IT en las organizaciones.*

Abstract: *This article explores the development of IT in organizations from hard, soft and critical systems thinking traditions, respectively. In addition, the role of IT in organizations and the social and technical interaction are subjects under analysis. This article primarily attempts to develop an insight of into the traditional computer systems analysis from a hard system approach, as it has been widely applied in order to enhance development of IT in organizations. Then, the article will discuss the contribution of the soft tradition, as it presents a fundamentally different view of human action. Finally, the article will introduce the new tradition: Critical Systems Thinking (CST), and discuss how this approach can enrich the development of IT in organizations.*

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1. Introduction

Most of the literature¹ and the practice of the development of information technologies (IT) in organizations seem to be focused upon the technical part. [Davies and Wood-Harper, 1989: 61] It focuses attention on the technological devices in isolation where computer science plays an important role. It is concerned with the technical hardware development and software engineering, rather than with the relationships between IT and for example, individuals and the organization itself. Also it is clear that an historical overview of the evolution of IT in organizations allows us to have a better understanding of its present role in organizations. The significance that the computer itself is a radical invention² makes clear the social construction of IT. Furthermore, it is clear that IT is a strategic resource and there exists an important concern about how IT can fit into and support organizations. The history of IT displayed the relationship between the enabling effects of IT and organizational change.³

IT contains messy, complex, problem-solving components. In IT, complexity is presented in various shapes and forms and this possess a variety of difficulties that need to be addressed. These issues are key features in removing common assumptions made by most of the persons involved in the development of IT in organizations: that the use of IT is only a technical matter.

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- 1 Davies and Wood-Harper argue that the literature of Information Systems (IS) development is dominated by a rationality which is rooted in logical positivism and functionalism, which suggest that data flow design is more important than the nature of information. [Davies and Wood-Harper, 1989: 61] In addition, the predominant view of IS equate of computing, focusing in technical hardware development and software engineering, which concern of computing science. Winograd and Flores show how in the literature on computers and decision making, a wide range of human activities and concerns are subjected to an rationalistic analysis given more importance to the technical part of IT development. [Winograd and Flores, 1986: 20]
 - 2 Hughes shows how the history of evolution of a large technological system, for instance IT, can be presented in the phases in which the activity named predominates: invention, development, innovation, transfer and growth, competition and consolidation. [Hughes, 1987: 56] Development is the phase in which the social construction of technology becomes clear. Innovation clearly reveals technologically complex systems, as they combine the invented and developed physical components into a complex system consisting of manufacturing, sales and services facilities. [Ibid.: 64] The transfer of technology, though, which can occur at any time during the history of the technological system, [Ibid.: 66] is clearer after the innovation phase. Technological systems, even after growth, competition and consolidation, do not become autonomous; they acquire momentum. [Ibid.: 76]
 - 3 Tapscoff and Caston present the paradigm shift in IT and how it relates to other changes in the world. For instance, the technology paradigm parallels the other shifts. Like the new enterprise, it is open and networked. It is modular and dynamic-based on interchangeable parts. It technologically empowers, distributing intelligence and decision makers to users. [Tapscoff and Caston, 1993: xiii]

This article explores the development of IT in organizations from hard, soft and critical systems thinking traditions, respectively. In addition, the role of IT in organizations and the social and technical interaction are subjects under analysis. This article primarily attempts to develop an insight into the traditional computer systems analysis from a hard system approach, as it has been widely applied in order to enhance development of IT in organizations. Then, the article will discuss the contribution of the soft tradition, as it presents a fundamentally different view of human action. Finally, the article will introduce the new tradition: Critical Systems Thinking (CST), and discuss how this approach can enrich the development of IT in organizations.

2. Computer Systems Analysis (CSA) and its Critique

It is probably correct to say that the history of IT implementation in organizations has not provided the quick success, or gains efficiency that was anticipated. Actually, organizations find a competitive environment in which IT is considered very helpful and managers keep the hope of being more competitive by using it. But, there is not a causal relationship between the development of formal IT in the organization and the improvement of organizational performance. [Lyytinen, 1987: 4] Some of the possible causes are argued to be the approaches undertaken, which did not take into consideration the real informational needs of the organization and/or the methodologies used by engineering systems which are not powerful enough. [Bloomfield and Best, 1992: 534]

The reason for all these problems surrounding the development of IT in organizations could be focused on a limited spectrum of development issues. Technology and engineering are interested in action directed to a defined end, and whether it is successful or not. [Checkland, 1978: 100] This fact has been depicted clearly by the picture of systems engineering, which is more focused on achieving a good design rather than analyzing the way they went about achieving it. [*Ibid.*: 101] Thus, the core of CSA is the single idea that a real-world problem can be formulated in the way of defining both the actual and desired situation and then proposing and selecting the best way or alternative solution. Checkland argued that the belief that real-world problems can be formulated in this way is the distinguishing characteristic of all hard systems thinking.

According to all explained above, it seems to be that the perception by analysts of the system (problem situation) in study, can be expressed by a positivist point of view. The knowledge about the system can be an explicit statement of laws and facts that are positively corroborated by measurement. [Lyytinen, 1987: 9] So, it is possible to suggest that there are two main weaknesses of the CSA methodology. They are as follows:

Firstly, CSA and the different methods and techniques associated with it are concentrated more on the design of both the applications [Lyytinen, 1987: 4] and the implementation of IT in an organization, which merely focus on technical issues, ignoring some factors that influence its use. For instance, social and political matter of the organization, changing in the organizational environment, etc. Davies and Wood-Harper [1989] argue that most of the current methodologies are concerned with computing science, where the 'framework is essentially technical in nature and is concerned with the technical aspects of work or data flow'. [Ibid.: 63] The principal view related in information/data as an entity and the world of computer programming. That is, when information is treated as an entity which operates in logical form within the technological necessity of fulfilling the organizational goals. In relation to the systems life cycle, a computational view focuses the problem in structuring the concept of the problem to be capable of representation and manipulation of the information through a computer-based technology. [Ibid.: 62] We can appreciate that these views offer little consideration to the political and social elements of the development of IT in an organization.

Secondly, the understanding of both the problem situation and its possible solution is made from both a positivist and a reductionist point of view. It is an inadequate conceptual base to deal with the complexity surrounding the development of IT in organizations. Reductionism (both in science and in design), 'is not able to deal with the holistic transcendental character of phenomena'. [Fuenmayor and Lopez, 1991: 446] Structured methods address technical complexity, using tools of reductionism, rather than recognizing sociotechnical complexity. [Vidgen, 1997: 21] This position neglects the need for a widely systemic approach to deal with the problem situation. Winograd and Flores claim that a rationalistic tradition led to many of the problems created by the use of computers, as it presents a blindness to the nature of human thought, leading to a broad misunderstanding of the role that will be played by computers. [Winograd and Flores, 1986: 8]

3. Soft Systems Approach and the Development of Information Technology in Organizations

The Soft systems tradition has a provenance in Churchman's work [1971], an inquiring system. Significant characteristics of Churchman's work lie in the emphasis of participation ('sweeping in'), and a recognition that any world view is restricted. He argues that no optimal design of a part of a system is possible without prior knowledge of the 'whole' system. [Churchman, 1971: 42] For him, systems are not real entities existing 'out there' waiting to be identified. [Flood and Jackson, 1991a: 126] Rather, systems are whole systems judgements. This suggests a process

of enquiry, which focuses on taking into account different people's perceptions of the problem situation or systems. This fact allows a process of contrasting ideas and debate in order to understand the situation problem. This general framework led Checkland to conclude that there are two paradigms in systems thinking, the hard and soft paradigm. As it was explained earlier, in the hard paradigm, the real world is assumed to be systemic and the methodologies that are used to investigate that reality are systematic. [Flood and Jackson, 1991b: 170] Soft paradigm sees the world as problematical but the process of enquiry into it may be systemic. [Flood and Jackson, 1991b: 170] Checkland and Scholes [1981] define systemic as the properties, which refer to the whole and are meaningless in terms of the parts that make up the whole (emergent properties). Fundamentally, the soft tradition portrays a different view of human action. It rejects the goal-seeking model of human behavior. Therefore, the core of the 'soft' tradition concerns a debate about possible courses, which might be followed and the relationships they will affect. [Checkland, 1998: 47]

4. Some Considerations of the Use of Soft Systems Methodology (SSM) in the Development of IT in Organizations

Checkland and Scholes [1981] define SSM as a methodology that aims to bring about improvement in areas of social concern by activating a learning cycle for the people involved in the situation, which is ideally never-ending. The learning takes place through the interactive process of using systems concepts to reflect upon and debate perceptions about the real world. Systems ideas are used to organize thought about a problem situation [Vidgen, 1997: 23], which permits the analyst to focus on problem formulation and what needs to be done rather than problem solving.

In this sense, the development of Information Systems (IS), should be concerned with a broader perspective [Checkland and Scholes, 1981: 53-58], rather than being concerned with just developing the specification of a perceived problem, IS should involve human activity, with attention to purposeful action which the IS serve. [Checkland and Scholes, 1981: 307] The boundary of an IS must be based upon human activity and should have a designer guarantee, with a proactive user's participation, that users can interpret that manipulated data into an attribute organizational meaning.

Now, one can appreciate that dealing with SSM requires a different understanding of the notions of systems by the practitioners and the stakeholders of the systems. It could be said that analysts require experience; they must be aware of this fact, addressing activities that permit both the analyst and persons

involved in the project to internalize these concepts. On the other hand, methodologies of expression, such as the rich picture, provide a useful starting point for the identification of stakeholders and for gaining a pre-understanding of the problem situation. [Vidgen, 1997: 45] The construction of many root definitions may address the problem that clients and owners do not necessarily have a clear understanding of the problem situation. [Jayaratna, 1991: 66] SSM provide all concerned, including the analysts, opportunities to understand and to deal with the problem situation. The analysts are perceived as being involved in the problem situation. [Avison, 1992: 249] Furthermore, as the core of the 'soft' tradition concerns debates about possible courses of insight into the problem situation, given recommendations and taking action, SSM users need to have a high degree of interpersonal skills. [Jayaratna, 1991: 67]

In summary, SSM, which is based on an organized set of principles, which guide action in trying to manage real-world problem situations, is in my understanding a potential alternative to addressing the development of information technology in an organization. The fact that SSM is systems-thinking based and is applicable to taking purposeful action to change real situations, its use permits practitioners to have a better understanding of the problem situation. SSM deploys first of all a holistic view of the problem situation, and secondly it needs to generate a deeper process of analysis. An intellectual reasoning is required in order to build the relevant systems of the problem situation. But applying SSM to the development of IT technology does not present a clear solution to the gap existing between the conception of the problem situation and the construction of an application, which at the end of the day, in the eyes of most of managers and analysts is the palpable solution. However, it is true that implementation is to a lesser extent not as technical as design and construction, as it also concerns social matter; and that the specification may be supported by formal methods in order to maximize computer based-technology resources. It seems that the complexity of the development of IT in organizations is regarded in the complexity between the understanding of the problem situation and the design of the IT system, i.e. bridging from social analysis to IT design. The *multiview methodology* [Avison and Wood-Harper, 1990] differentiates IS issues between what is organizational in nature and what demands technical or computing approaches.

5. Critical Systems Thinking and the Development of Information Technology in Organizations

Although a positivistic and reductionistic tradition has been the basis for a great deal of technological progress, these traditions that underpins the hard tradition limits the domain of its applicability. And the soft tradition neglects dealing with

the technical context of the IT development in organizations. The complexity surrounding the development of IT in organizations presents a variety of contexts within problem situations, which first of all, they are presented in an inextricably interlinked way and secondly, they belong to different domains (hard and soft). It seems to be then, that the domain of the development of IT in organizations is neither from a hard systems tradition nor from a soft systems tradition.

The principal purpose of this section is to introduce the new tradition: *Critical Systems Thinking (CST)*, and how this approach can enrich the development of IT in organizations. This section will discuss the benefits to the development of IT in organizations of this approach, through a reflection of its three commitments: *Critical awareness*, *Emancipation* and *Methodological Complementarism*, and the theory and practices of the development of IT in organizations.

5.1. What is Critical Systems Thinking?

The emergence of CST has brought a new tradition of thinking to management and systems sciences. Flood and Jackson [1991b] claim that CST shares the soft tradition critique of hard approaches, but generates the possibility of good use of such approaches through a reflection of the context in which they would be employed. [Flood and Jackson, 1991b: 1] CST possesses three fundamental commitments:⁴ *Critical awareness*, *Emancipation* and *Methodological Complementarism*. These commitments are summarized by Flood and Jackson [1991b: 2] and Flood and Romm [1996: 81], as follows:

- *Critical awareness*: To critique or reflect on the relationship between different organizational and societal interests and the dominance of different theories and methodologies.
- *Emancipation*: To develop system thinking and practice beyond its present conservative limitations and, in particular, to formulate new methodologies where the operation of power prevents proper use of systems approaches.
- *Methodological Complementarism*: To reveal and critique the theoretical (ontological and epistemological) and methodological bases of systems

⁴ Five commitments or interrelated intentions were identified by Jackson [1991]: *critical awareness*, *emancipation*, *complementarism at the methodological level and at the theoretical level and social awareness*. As methodologies embody theoretical assumptions, the two forms of *complementarism* was reduced to methodological pluralism. *Social awareness* becomes an implicit part of the commitment to *emancipation*.[Midgley, 1996: 11]

approaches, and to reflect on the problem situations in which approaches can be properly employed and to critique their actual use.

Midgley [1996] shows critical awareness to be in support of the commitment to methodological pluralism and of the commitment of emancipation. It is primarily based on an understanding of the strengths and weaknesses and the theoretical underpinning of available methods. Secondly, critical awareness aids in our attempts to understand both the context of application and the possible consequences of using various methodologies. Finally, it provides a close examination of the assumptions and values entering into the design of the solution. According to Midgley the support of the commitment to methodological pluralism relates two critical issues: critical thinking about methodology - development of effective metatheories, and critical use of the methodology or methodologies selected, where the focus of critique is the context of application. The support to the commitment of emancipation is, in fact, a statement that power relations can be understood and improvement defined within an ethical framework. The following sections will utilize critical awareness to present both methodological complementarism and emancipation. These will be examined to help reflect the applicability of CST in the development of IT in organizations.

5.2. Methodological Complementarism Commitment and the Development of IT in Organizations

Methodological Complementarism suggests reflection upon the variety of different contexts present in a problem situation and its relationship with the range of approaches that are available to undertake it. That is, questioning the methods, practices and theories.[Schechter, 1991] In this sense, there is not one single approach which can deal with all the problem situations and all systems approaches are able to be used, through reflecting upon the strengths and weaknesses of hard, soft and emancipatory approaches in order to address a problem situation. This suggests a complementary manner of addressing the complexity of the development of IT in organizations.

The development of IT in organizations is involved in many of the classical problems of an organization, where relations of power and political aspects of organizations and their environment are presented. Regarding Churchman's dialectical inquiry [1971] one can appreciate that the development of IT in organizations is teleological. It has a set of goals, which are related with the IT implementation in its specific context. It seems that these sets of goals have a strong relationship with the areas of knowledge involved; that is, in the domains of IT and management science. In addition, although these kinds of projects tend to

serve the interest of the persons who pay the designer, in the analysis phase, participation and interrelation between analysts and clients is necessary. Ideally, within a participatory approach, everyone should be involved in the decision making process. However, frequently in the practice the decision maker is defined by those who exercise power, who are ultimately important when dealing with the creation of participatory fora, as they are, at the end of the day, who the designer or developer wants to serve.

In the development of IT in organizations several components are present. They could be as follows:

- Culture, values and policies of consultant firm (if this is required).
- Culture, values and policies of the organization as such.
- Different knowledge involved (e.g. IT, organizational and management knowledge).
- IT itself, which is represented by the suppliers. And finally,
- The needs and skills of the persons involved in the project and affected by the implementation.

In the IT community and computing context, formal notation and measures oriented to technical matters are relevant in order to produce quality software.

According to the above, one can appreciate that a variety of contexts are presented in the development of IT in organizations. And the principal activities of the three main phases of the system life cycle are related to a specific context. That is, the analysis phase deals with the richness of the real world depicted in an organization; the view of the phase of construction is concerned more with a computational context where formality is relevant. And finally, in the implementation phase the implications of the decision-making done are appreciated.

The domain of the development of IT in organizations is best approached neither from a hard systems tradition nor from a soft systems tradition. Hard and soft traditions provide means to address the development of IT in organizations from two different paradigms, which are based on empiricist and hermeneutic methodological foundations respectively. *Methodological complementarism*, through a critique of the theoretical and methodological bases of systems approaches, supplements a reflection on the context situation in which the IT development is immersed. This proposal allows us to combine these paradigms to build a temporarily suitable approach for the particular problem situation. *Methodological complementarism* presents an interesting approach to deal with

the complexity of these kind of projects, and allows the application of an appropriate systems-based intervention methodology to fit both the specific organizational context and the computing context.

5.3. The Emancipation Commitment

The critical concern of communicative distortions, false consciousness and other ideological distortions, allows a recognition of coercive contexts. [Schechter, 1991: 218] Therefore, new developments in methodologies focus on 'improvement'. [Midgley, 1996] Improvement, which is defined dynamically and locally, takes issues of power into account.

Analysts will be aware of the social and political implications of IT implementation for those who are involved in the problem situation and those who will be affected by it. Next part of the section presents an insight of improvement and the development of IT in organizations.

Designers and developers of IT in organizations, for instance IT consultants, claim to have technical expertise but they are far from being mere technical experts, so they stress when speaking about organizations and IT. Bloomfield and Danieli [1995] draw some stratagems deployed by IT consultants as follows: First of all, making themselves indispensable to clients, creating a niche and persuading clients that they are within it, they seek to portray themselves as an obligatory passage point if IT implementation is desired. Secondly, the consultants' profile has to be maintained during the consultancy engagement. These stratagems are constitutive of the role of consultancy practice. IT consultants represent the category of change agents. They manage a special vocabulary that seems to be the same as the language of a manager, which managers believe adds value to the organization. But rather, this organizational knowledge expressed by IT consultants shows that problems could be redefined in terms of existing IT solutions. [Bloomfield and Best, 1992: 544] The problems are formulated and the (pre-established) solution is proposed.

Such an assumption that IT consultants make interventions in the organization with a pre-established solution, which could create bias due to the fact that the problematic situation under study could be understood only from an IT perspective. That is, the intervention would focus on adapting problem issues to pre-established

5 Emancipatory practice in CST has taken into account the Operational Research (OR) movement. Schechter [1991: 219] argues that emancipatory OR methods must: serve the oppressed, striving liberation and social justice, support all those who are involved in the problem situation and secure a process of transforming oppressive social systems.

IT solutions, which could be the result of previous experiences in other companies. From improving the organization as a system, *boundaries* of analysis take crucial importance.[Midgley *et al*, 1998] From the context shown above, improvement of the organisation would not clearly be seen, because the boundary of the system could be limited by prior assumption that the solution is regarded only in the IT domain. In order to understand the meaning of the system to be studied by analysts, an insight of its contexts of application is needed. This means that an increase in the scope of the boundary is necessary to take into account all those who are involved and affected by the implementation of IT. Obtaining the objective necessities of these agents let analysts to have a wider view of the problem situation but also come into view the implications of the decisions made in the context of application.

6. Conclusions

In the development of IT in organizations complexity is presented in various shapes and forms and this possess a variety of difficulties which need to be addressed. Hence, one of the major assumptions made by most of the persons involved in the development of IT in organizations —that the use of IT is only a technical matter— must be removed. On the contrary, some of the different issues are concerned with the computer-based technology, both hardware and software, human and organizational behavior, the social construction that IT itself presents and the different rational processes that are undertaken, and the tools and techniques that guide the solution of the problem situation. These issues, rather than being involved in the problem situation in an isolated way, are in fact strongly interlinked.

The argument here is that the understanding of the development of IT in organizations requires more than a technical approach. However, the domain of the development of IT in organizations is best approached neither from a hard systems tradition nor from a soft systems tradition. Hard and soft traditions provide means to address the development of IT in organizations from two different paradigms, which are based on empiricist and hermeneutic methodological foundations respectively.

In order to enrich the understanding of the development of IT in organizations, the predominant conceptualisation that the role of IT is based only on technical matters should be one of the first ideological constraints to be contended by analysts. Thus, human action, and the social and political aspects of the organization need to gain more importance in order to understand the social and technical interaction. That is, break the dichotomy between what is science and what is politics in order to have a proper understanding of social and scientific change. [Callon *et al*, 1986] Furthermore, the manager's role in these kinds of processes should be more

proactive. An emancipatory approach through a process of knowledge and understanding of both the role of IT and the problem situation is needed. So, improvement become apparent to the people involved. In this sense, an emancipatory approach provides the concerned people with a position to determine their true interest in IT and its relationship with the organization.

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