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The Circuits-of-Power Framework for Studying Power in Institutionalization of Information Systems*

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Abstract

This paper introduces an adaptation of the Circuits of Power, a framework for studying institutionalization as an outcome of power. In this paper, we have interpreted each of the framework's concepts and linked them to relevant research questions about power in the institutionalization of information systems. The institutionalization of an information system entails stabilizing its processes to such a degree that its associated practices become routine. We argue that an institutionalized system is both the result and a source of power. The original Circuits framework (Clegg 1989) is grounded in organizational theory and social sciences and integrates different perspectives on power. Each perspective unravels a different dimension of power that complements and enriches the others – hence it is a profound tool for analyzing a complex phenomenon such as power. In a longitudinal in-depth case study, we use the adapted framework as an interpretive research instrument to make sense of power and its relation to the institutionalization of an information system. The paper concludes by discussing the possibilities the framework offers to practitioners and its implications for researchers.

Keywords: Power, Politics, Adoption, Institutionalization, Implementation, Diffusion

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Introduction

Questions about how information systems are related to power have been central to research in our field for the last two decades. There are studies concerning each stage of the information systems life cycle. For example, we know that analysts' worldviews influence the systems analysis and final design stages (Kling 1991; Tan, Watson, et al. 1995; Tan, Wei, Watson, Clapper et al. 1998; Alvarez 2002; Davidson 2002). This process can be laden with particular or group interests (Hirschheim and Klein 1994; Bloomfield and Coombs 1992; Sillince and Mouakket 1998; Griffith, Fueller et al. 1998; Robey and Boudreau 1999; Marsahall and Brady 2001; Thanasankit 2002; Saravanamuthu 2002; Howcroft and Wilson 2003). We also know that the implementation process can be a source of conflict between information systems professionals and users (Keen 1981; Markus 1983; Markus and Bjorn-Anderson 1987; Robey and Smith 1993; Newman and Sabherwal 1996).

Furthermore, information systems, once in place, can be instruments of surveillance and control as well as tools for instilling discipline (Zuboff 1988; Introna 1997; Pinsonneault and Kraemer 1997). Likewise, information technology can be regarded as an instrument for empowerment and as a vehicle for autonomy (Bjorn-Andersen et al. 1982; Ehn and Kyng 1987; Williams and Wilson 1997; Dennis, Hilmer, et al. 1998). Researchers have also observed the political connotations of the information systems function in organizations (Lucas 1984; Cavaye and Christiansen 1996; Saunders and Scammel 1986). Although individually all these studies have made contributions to our understanding of power, there has yet to emerge a theoretical model that can give an integrated account of power throughout the entire process of information systems design, development and implementation, that is, from conception to institutionalization.

A recent study by Jasperson et. al. (2002) examined a sample of 82 papers concerning the relationship between power and information systems. Not surprisingly, they found that this relationship has been studied from multiple theoretical perspectives. Nevertheless, very few articles – 13 of the 82 – integrate different perspectives. The rest were one-dimensional. A one-dimensional view of power, however insightful, falls short in depicting its complexity. By contrast, as Jasperson et. al. (2002) notice in their paper, an integrative theoretical approach, by virtue of its variety, would not only present the different insights of its components, but would also allow researchers to identify contradictions and paradoxes that otherwise would not be apparent. The idea that power is a phenomenon whose understanding requires multiple theoretical perspectives is also sustained in our field by Sillince and Mouakket (1997, 1998). Hence, the main purpose and motivation of this paper is the integration of different conceptions of power into a theoretical framework for the study of the institutionalization of information systems.

We adopted the notion of institutionalization from the work of the sociologists Berger and Luckman (1967). By drawing on these authors' work we can say that information systems become institutionalized when they are no longer considered as novelties, but as unnoticed and unremarkable tools that people take for granted in doing their work. An information system is institutionalized when associated practices and procedures have become routines that can be regarded as organizational habits. These organizational habits become typified in such a way that each particular type of action will be executed by specific kinds of users. We argue that the exercise of power is required to institutionalize a system, particularly if the system is resisted, and, once in place, it becomes a source of power.

Thus, this paper has two research objectives. One is the adaptation of a theoretical framework that was originally developed in the fields of sociology and organization studies to explore the role of power in the institutionalization of information systems. The second objective of the paper is to demonstrate the explanatory power of the framework by virtue of an in-depth case study. The value of the framework is thus shown in two ways. First, it guides the identification of the data required to compose a compelling narrative about the institutionalization of the information system. Second, it has value as an analytical tool by obtaining theoretical and practical implications about the phenomena of power and the institutionalization of information systems.

This paper is structured according to our research goals. Hence, in the next section we introduce the theoretical framework, its main concepts, and our interpretation of how to apply it to study the institutionalization of information systems. Our research approach is introduced in Section Three, while Section Four presents the results of our fieldwork, a longitudinal in-depth case study that traces an information system from its inception to its eventual institutionalization. Section Five concerns the analysis of the case and highlights the different components of the framework and how they are related to the data. Finally, in Section Six we reflect on the implications, contributions, and limitations of our work.

The Circuits of Power Framework

The proposed framework is an adaptation of Clegg's Circuits of Power (1989). Among the different theories for the study of power, we selected the Circuits framework because it integrates different views about and perspectives on power. The concepts brought about by Clegg derive from relevant advances in the sociology of sciences (Callon 1986; Callon 1987; Latour 1987; Law 1986) and the sociology of organizations (DiMaggio 1988; Meyer and Rowan 1991; DiMaggio and Powell 1991). The Circuits framework also includes power concepts from political science and sociology, such as those found in the works of Lockwood (1964), Parsons (1967), and Lukes (1974). Clegg also integrates into his model the notion of disciplinary power (Foucault, 1977). In addition to combining different views of power, another of the appealing characteristics of the framework stems from its conception of power as fundamentally strategic, applying Machiavelli's insights. Clegg is interested not only in the actions of organizational agents, but also in their intentions, strategies, and plots.

In the Circuits framework, power is central in sustaining and providing stability to social systems. This is a different conception of power than the one contained in structuration theory (Giddens, 1984). Giddens (1984: 257) defines power as "the capacity of agents to achieve outcomes." It is essential in Giddens' conception that individuals are knowledgeable and that in acting they reflect on their own situation. It would be fair to say that Giddens' conception of power concentrates on individuals' actions (Layder, 1987; Barbalet, 1987). When comparing Clegg's model of power with Giddens' structuration theory, the most distinctive difference is that the former considers power beyond actions. In Giddens' proposal, the idea of a knowledgeable individual is fundamental to understand how social life is structured. However, Giddens does not explain how the knowledgeable individual is constituted. By incorporating Foucault's work into the framework, Clegg is able to link the construction of the knowledgeable individual with power. The knowledgeable individual, then, is the result of discourses and

disciplinary techniques. This is what Clegg's notion of power adds to a conception based on agency.

There are three circuits of power: episodic, social and systemic.¹ Clegg argues that, for an innovation to be adopted and then institutionalized, it has to be integrated into the organization at three levels that correspond to the three circuits of power. These three levels are; episodic, social integration, and systemic integration. Each circuit is defined by a different type of power: causal in the episodic circuit, dispositional for social integration, and facilitative for systemic integration. Clegg uses the metaphor of circuits to emphasize the relational nature of power. In fact, nothing actually circulates or moves; this is merely a ready-to-hand metaphor. What occurs is that rules, procedures, and techniques of discipline shape both interpersonal relations and work tasks, thus circumscribing the scope for action of the individuals in organizations. So strong are these social and disciplinary forces that the electro-physical circuit metaphor renders the idea well.

The Circuits of Power framework is not an exhaustive theory, yet it integrates several different concepts of power to account for the process of institutionalization. In this sense, Clegg (1989: 239) asserts that the virtue of his framework is "...to admit an insight to each distinct conception which the others do not share. On this basis, power can be understood analytically as moving through three distinct circuits, carried always by the organization of agencies."² It is the integration of those different conceptions that provides the theory with its explanatory power. As it will be shown in the narrative and analysis of the case, an account of power based on only one dimension would not be as clear as one that integrates different views.

The following subsections offer a more detailed description of each circuit and present the aspects of information systems research that are derived from them. These have been summarized in Table 1. The Table shows the main concepts of the framework in columns one and two, and we introduce our interpretation and adaptation of the framework in columns three and four. In column three, we make a link between the concepts of the framework and previously researched power issues in the field of information systems, allowing us to formulate research questions. Thus in our adaptation of the framework, we interpret its concepts, link them to information systems research issues, and frame specific research questions in order to account for the circuits of power in information systems institutionalization.

¹ Clegg uses the term system integration; however, to avoid semantic misunderstandings with the way we use the term system, we will refer to this circuit as "systemic integration".

² In his book, "Frameworks of Power" (see Clegg (1989)), Clegg argues for the integrative nature of his framework by discussing the different theoretical approaches to power from Hobbes to Callon (1986). It meticulously examines other organizational frameworks of power. For example, in discussing resource dependency theory Pfeffer, (1981) Clegg (1989: 190) would integrate this concept in his framework, in the sense that A's power over B depends on A controlling resources. Furthermore, Clegg would extend his framework to the organizational norms and rules of practice that predetermine their relationship.

Episodic Circuit of Power and Causal Power

The character of this circuit can be recognized in Dahl's (1957) definition of power: *A* exercises power over *B* when *A* makes *B* do something *B* otherwise would not do. For the purpose of this paper, we can define this relationship as the one that managers, or other powerful organizational agents, have with systems users. This relationship would be especially apt when managers make users operate a system that, given the opportunity, they would not otherwise use. John Law (1991) calls the power circulating in the episodic circuit 'power over' or causal power. The essence of 'power over' he maintains, lies in its relational nature, which can be seen in the relationship between *A* and *B*. The outcomes of causal power are actions; *B* does things he or she would not otherwise do. Therefore, without resistance, causal power cannot be identified (Foucault, 1982³). It follows that we could not claim that power has been exercised if users were willing to use the system. In such a situation, causal power has not been exerted.

For the purposes of studying the institutionalization of information systems as an outcome of power, the main research issue derived from this circuit is the identification of the *As* and *Bs*, establishing who are the promoters and champions of a system and who are its resisters. The next analytical step is the formulation of *A*'s desired outcome, articulated in terms of *B*'s actions; e.g. one strives to implement the system while the other struggles to resist it. In addition, we need to establish what are the tactics and strategies adopted by each side during these disputes. Finally, the episodic circuit is complete when we can identify the standing conditions of both *A* and *B* i.e. the positions that they occupy in the organization and the resources to which they have access and which they deploy in the course of their struggles over the system. As will be discussed in the next section, the concept of standing conditions directly links the circuit of episodic power with that of social integration.

The Circuit of Social Integration and Dispositional Power

While episodic power concentrates on causal power, the circuit of social integration emphasizes dispositional power, with its main elements being the rules that govern meaning and membership in organizations. Wrong (1995) conceptualized dispositional power as a set of capacities and made a distinction between the notions of having and exercising power. In this sense, a capacity is a characteristic or position that entitles or enables someone to exercise power, but does not necessarily imply its exercise. Power conceived in this manner is a capacity that can cause something to happen. Clegg

³ Power is present even if there is no behavior associated. Clegg (1989) points out that limiting the analysis of power only to the concept episodic power would constrain our understanding of this phenomenon. In making this point Clegg cites Bacharach's and Baratz's (1962) notion of mobilization of bias; that illustrates how power is exercised without manifesting any behavior. Clegg complements Dahl's behavioral definition of power by adding the other two circuits of power.

illustrates the idea of dispositional power with the example of a traffic police officer on a busy street who has the power to stop the traffic, whether he actually does it or not. The dispositional power of the police officer is embedded in the shared norms that bind the institutions of traffic regulations and the police in an urban society. Dispositional power becomes causal power when the policeman decides to intervene to regulate traffic.

Table 1. The Circuits Framework as proposed by Clegg; its relation to information systems and our interpretation

Circuit	Type of power	Exemplary Research in information systems and Main Ideas	Our Interpretation of the Framework in Terms of Research Issues
Episodic	<i>Causal Power</i> When A makes B do something B otherwise would not do.	(Keen 1981; Markus 1983; Markus and Bjorn-Andersen 1987; Wynne and Otway 1982; Franz and Robey 1984; Newman and Robey, 1992; Robey and Smith 1993; Beath 1991; Newman and Sabherwal 1996; Sillince and Mouakket 1997; Tractinsky and Jarvenpaa 1995; Robey and Boudreau 1999; Torvinen and Jalonen 2000) <ul style="list-style-type: none"> • Focus on the relations between systems professionals and users • Emphasis on alliances and commitment for the implementation of systems • The idea of a champion getting support for a new system • Relations between managers and subordinates; the former inducing conduct by the latter 	<ul style="list-style-type: none"> • Who are the As and Bs? The identification of those promoting and championing the system and those who resist it. • What are the particular objectives of As and Bs in their struggles around the system? • What are the strategies and tactics adopted by As and Bs for the achievement of their objectives? • What are the standing conditions of As and Bs? These should be given in terms of the positions hold by As and Bs in the organizational structure. • What are the resources that As and Bs have access to and deploy in striving to achieve their objectives?
Social Integration	<i>Dispositional Power</i> It provides the conditions for As to exercise power. It is rooted in rules of meaning and membership of the organization.	(Boland 1993; Boland 1996; Boland and Tenkasi, 1995; Kling 1991; Bloomfield and Coombs 1992; Monteiro and Hanseth 1995; Walsham 1993; Noble and Newman 1993; Tan, Watson et al. 1995; Tan, Wei, Wei, Watson and Walczuch 1998; Alvarez 2002; Davidson 2002; Thanasankit 2002) <ul style="list-style-type: none"> • The relevance of language and meanings as channels of power • The role of language and discourse and its relationship to technology in the exercise of power • The relevance of status in power relations • Culture and power 	<ul style="list-style-type: none"> • What are the organizational rules and norms that place As and Bs in their respective positions? • How will the institutionalized information system affect those organizational rules and norms? • What are the meanings assigned to the information system throughout the institutionalization process? • What are the rules and modalities of interpretation drawn on by organizational members in making sense of the system? • How would these modalities be affected by the institutionalized information system?
Systemic Integration	<i>Facilitative Power</i> This power is fruitful in the sense that causes the organization to generate outcomes. It is defined by the techniques of production and discipline of the organization	(Zuboff 1988; Orlikowski 1992; Walsham 1993; Bjorn-Andersen et al. 1982; Hirschheim and Klein 1994; Williams and Wilson 1997; Pinsonneault and Kraemer 1997; Dennis, Hilmer et al. 1998; Griffith, Fuller et al. 1998; Sillince and Mouakket 1998; Tan, Wei et al. 1998; Marshall and Brady 2001; Saravanamuthu 2002; Howcroft and Wilson 2003) <ul style="list-style-type: none"> • Information systems as the electronic panopticon; dominance and hegemony • Power and information systems as resources to achieve outcomes • Information systems as instruments of oppression or emancipation • Dominance in groups • Information systems and control • Achievement of organizational outcomes 	<ul style="list-style-type: none"> • What are the techniques employed by A to ensure and monitor B's compliance? • What are the work tasks that are affected by the new information system? The work tasks before and after the institutionalization of the system. • How can the system be set up as a resource to instill discipline?

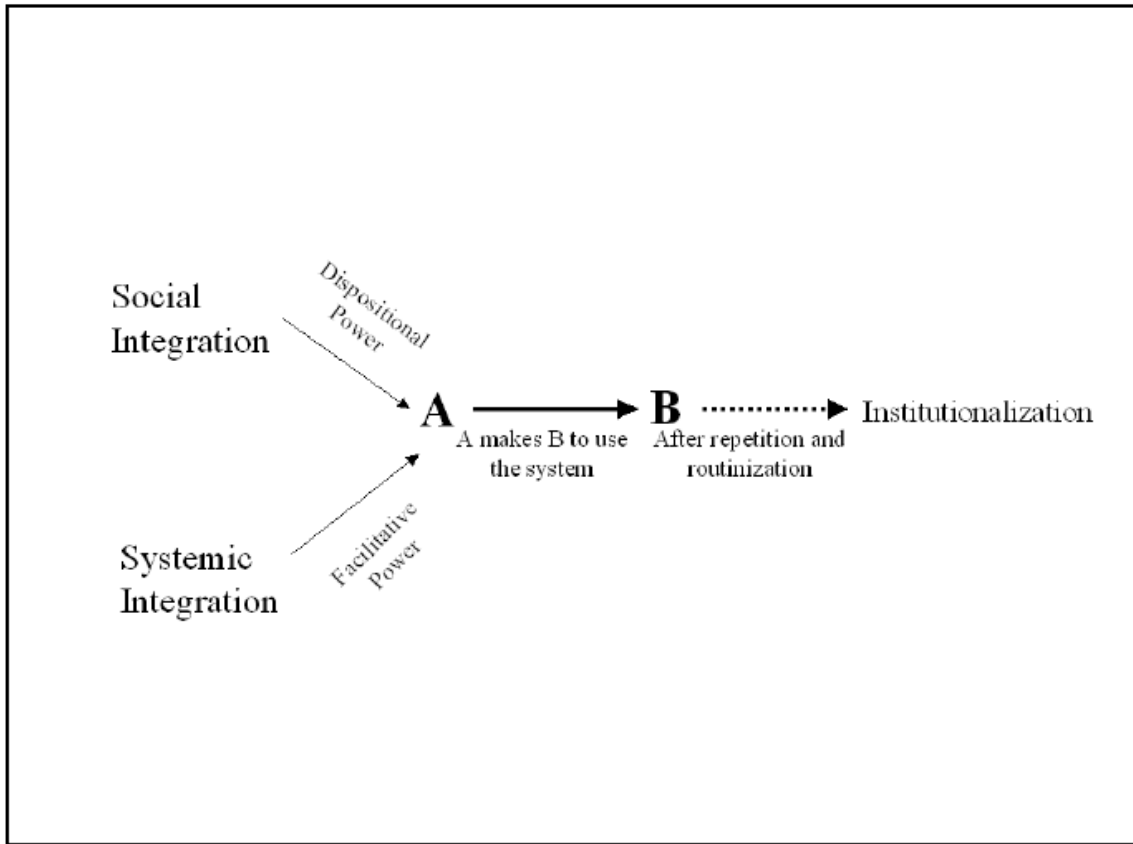


Figure 1. The Circuits of Power and its Outcome: Institutionalization

Dispositional power is the type of power that enables one organizational member to influence other members' behavior even when such behavior may ostensibly be against their interests (Lukes 1974). Accordingly, the first research issue here is to identify the organizational rules that place *A* in a position to tell *B* what to do, and especially when *B* would rather do otherwise. It concerns directly the formal statutes and rules of the organization. By the same token, this issue entails the identification of the set of rules that leaves *B* in a position to be told what to do. In this sense, the analysis of dispositional power consists in identifying the standing conditions of *A* and *B* as discussed in the previous subsection. In addition, by its emphasis on the rules of membership, this circuit directs our attention to how an institutionalized system would affect the organization, specifically the composition of groups, roles and hierarchies. With successful deployment of power, the information system would eventually become institutionalized and integrated into the circuits of power of the organization.

In addition to focusing on formal structures, this circuit also concerns the informal side of the organization. The system has to be associated with discourses that legitimate its use and existence (Weick 1995). In the process of institutionalization, different types of users will execute the processes and tasks associated with the system. As a result, the system may change or reinforce the way different organizational members think about their jobs. These are the modalities of interpretation created, reconstituted, refreshed, reinforced, and drawn on by organizational members when assigning meanings to information systems (Walsham 1993). Thus, in terms of rules of meaning there are two levels of

analysis. The first one consists in tracing the meanings assigned to the system, from the time of the resistance to the stage when they have successfully been institutionalized. And the second concerns in identifying the rules of interpretation drawn on by organizational members throughout and after the institutionalization process.

The Circuit of Systemic Integration and Facilitative Power

This circuit considers power as facilitative (Parsons, 1967). Hence it is understood in terms of its ability to produce and achieve collective goals. The facilitative notion of power is positive, characterized by a non-zero sum game and a productive conception. While dispositional power is concerned with the capacities that pre-configure the standing conditions necessary for episodic power to occur, facilitative power comprises the material conditions of production, including those technological means for controlling the physical and social environment in organizations. Clegg (1989) calls these means techniques of production and discipline.⁴ For example, in an organization, managers (*As*) could draw on different techniques to discipline employees (*Bs*) whose conduct is regarded as discordant to organizational objectives. In this situation, *A*'s actions are legitimized by her standing conditions and facilitated by the techniques available to her.⁵ The resulting coordination in working practices is what we call systemic integration.

Organizational activity depends ultimately on the subordination of individuals to collective goals. The techniques that ensure organizational compliance are what Foucault (1977) termed 'disciplinary practices'. These practices consist mainly in the surveillance of organizational members through the collection, recording and comparison of data. These disciplinary practices can be recognized in different forms of organizational control over employees such as: "supervision, routinization, formalization, mechanization and legislation, which seek to effect increasing control of employees' behavior, dispositions and embodiment, precisely because they are organizational members" (Clegg 1989: 191). In addition to techniques, organizations also adopt policies of rewards and sanctions for disciplining their members.

As hinted above, this circuit addresses two main research questions: (1) what are the techniques deployed by *A* to ensure and monitor *B*'s compliance, and (2) what are the work tasks that are affected by the new information system? As discussed previously, the techniques of discipline are critical if the system is to be institutionalized. Once the institutionalization stage has been achieved, the system itself is transformed into an instrument for instilling discipline. Another research issue, therefore, is to identify how the system can be set up as a resource to instill discipline. Furthermore, the research task will be to distinguish the working practices related to the information system before and after its institutionalization. This is a power issue since an institutionalized system will affect the actions of organizational members as a result of the new work tasks embedded in the system.

All together, these three different perspectives make the Circuits framework a strong

⁴ In fact, Clegg (1989: 232) refers to facilitative power also as disciplinary, in the Foucaultian sense (Foucault 1977).

⁵ These techniques are not all the resources available to managers or other powerful agents. They are disciplinary practices, such as the surveillance of organizational members through the collection, register and comparison of performance data.

analytical tool. Figures 1 and 2 depict how the three are combined. The circuit of episodic power determines the roles of *As* and *Bs*, which are defined by the rules of meaning and membership: the key components of the circuit of social integration. Likewise, the tactics adopted by *As* and *Bs* are related to techniques of production and

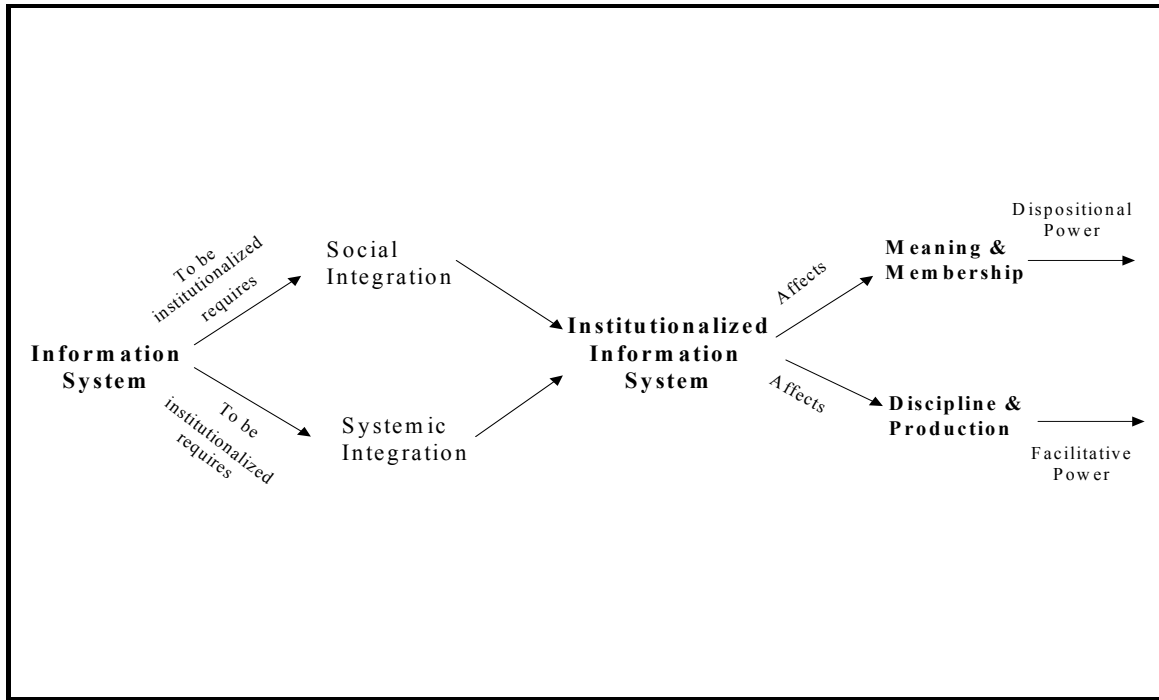


Figure 2. The Levels of Integration Required for Institutionalization

discipline, which are the very fundamentals of the systemic circuit. This relationship is depicted in Figure 1. The arrows from social and systemic integration denote how the dispositional and facilitative power of *A* is the result of those two organizational circuits of power. Figure 2, on the other hand, illustrates how institutionalization is interconnected with the other two circuits, social and systemic integration. It depicts how the system, once institutionalized, becomes embedded in the circuits of power of the organization and turns into a source of power.

In summary, we have seen in this section how we interpret each of the circuits of power and how they are linked to the institutionalization of information systems. In so doing, we have discussed how the power concepts suggested by the framework are related to the institutionalization of information systems. This paper argues that the institutionalization of an information system requires the integration of these three circuits of power and that institutionalization entails the system itself becoming a source of power. Hence our fieldwork has as its main purpose to demonstrate how this occurs in a particular organization. We collect data and establish our research questions regarding each circuit so we can develop a narrative of the case. The application of the framework will allow us to elicit theoretical propositions about power and the institutionalization of information systems.

Research approach

The site

This case study concerns the Center for the Study of Food and Nutrition Sciences of Central America (CFNCA)⁶, which has its headquarters in Guatemala City. One of the reasons we selected CFNCA as our research site was because of the compelling power issues in the adoption and institutionalization of its new administrative information system. Members of the organization identified conflicts and struggles throughout the design and implementation of the system, which is currently playing a fundamental role in managing the Center. Access was another factor in selecting this site. It is not easy to obtain access to organizations to do research, especially if the goal of the research is to discover power relations. Hence Buchanan et. al. (1988: 55) recommend a pragmatic, almost opportunistic, approach in the search of organizations for conducting fieldwork. But we were able to approach personnel and secure access to related documentation because one of the authors had worked there in the mid 1980s. His previous experience with the organization provides us with insights into its politics. Besides, this familiarity was fundamental not only when selecting our interviewees, but also in gaining their confidence.

The focus of this fieldwork is CFNCA's computerized administrative information system. Implemented in the early 1990s mainly as an initiative to control the finances of the Center, the system was institutionalized by 1996.

Given CFNCA's semi-autonomous nature and matrix structure, its administration presents interesting power aspects (see Figure 3). CFNCA is part of the Americas' Health System (AHS)⁷, which has its central offices in Washington D.C. and while AHS is responsible for the administration of CFNCA, the Center enjoys some degree of autonomy regarding the content, extent and human resources of its research projects, as spelled out by its founders, the Central American countries ministers of health, in 1948. Under AHS's administration, CFNCA's mission has been to conduct research on health and nutrition. AHS appoints two authorities to CFNCA: the research director and the administrator. The former is in charge of research activities while the latter manages the administrative functions.

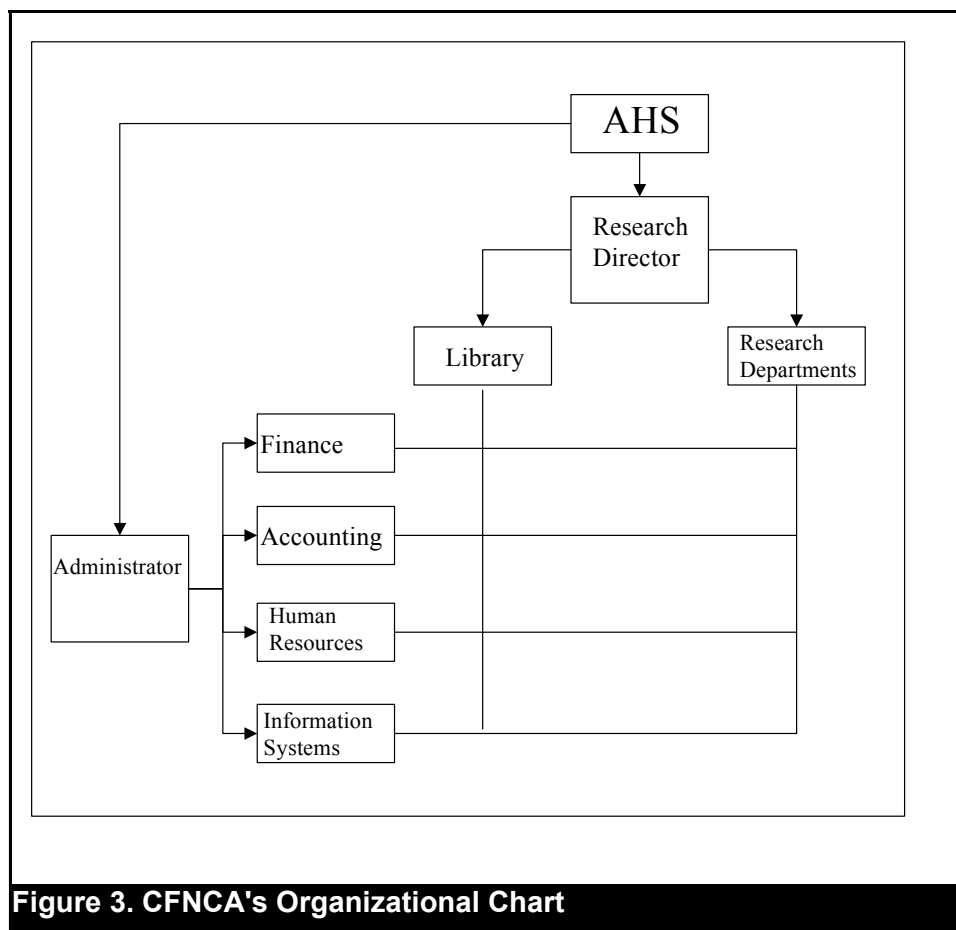
Data Collection

We collected data in two stages. For the first stage, we spent six weeks at the CFNCA headquarters, from the second week of December 1995 to the third week of January 1996. CFNCA's authorities gave us an office where we were based every day from 8:00 AM to 7:00 PM. During these hours, we conducted the interviews, typed the transcripts, attended meetings and also collected and reproduced relevant documents. The second stage spanned the autumn of 1996 to the end of January 1999. During that period of time, we visited CFNCA four times; each visit lasted about a week. We maintained close contacts with our informants via e-mail and telephone throughout the second stage of our fieldwork.

We developed interview guides following the concepts of the theoretical framework and

⁶The name of the organizations has been changed.

⁷ See footnote 7



conducted a total of 35 semi-structured interviews with an average duration of two hours (see Table 1 and the Appendix). The interviewees were allowed to express their views on aspects they considered of importance. Rather than taping the interviews, we took notes and, immediately after each interview, typed the transcripts. Although we acknowledge that taping would have provided more accuracy in terms of the expressions and use of language, the interviewees would have not felt comfortable talking about power issues in the organization knowing that they would be taped. Among the individuals interviewed were the director, administrator, and IT staff, as well as people who had recently been made redundant. Interviewing redundant staff was one of the essential elements for obtaining information about the politics of the organization. We noticed that those recently released from the organization talked very freely about power, while those still employed showed more restraint. We collected and analyzed 42 documents, including some written by external consultants. These consisted mainly of recommendations about the way the administrative information system should have been coordinated and the consultants' evaluations of the overall status of the system. We were allowed to photocopy some of the documents; otherwise we took notes. We classified each document according to author, date and type of document (i.e. memo, report, etc.). These documents played a crucial role in providing us with multiple interpretations regarding the situation of the system (Klein and Myers 1999).⁸

⁸ We constructed a Case Data Base. Documents were stored using the Endnotes package and

Data Analysis

We adopted an interpretive approach for the analysis of the data (Klein and Myers 1999; Walsham 1993), reading all the transcripts, documents and observation notes in order to identify issues and themes related to the institutionalization of the information system. In our analysis and interpretation we emphasized power issues, informed by the concepts of the theoretical framework. Then we proceeded to write a draft report of our findings – a preliminary version of the case study – which we shared with three of our informants. We incorporated their feedback into our case study, which helped us to complete the hermeneutic circle (Klein and Myers 1999). After the second round of readings, we were able to write a narrative that described how the institutionalization of the system occurred. To clarify our analysis, we built a matrix containing the events that led to the institutionalization of the system. These events were arranged in chronological order and then classified according to the conceptual framework.

The completion of the hermeneutic circle was also facilitated by one of the authors who had worked in this organization four years prior to the fieldwork. As mentioned above, this was fundamental for the analysis of our data since it provided us with valuable insights regarding the context of the system and the organization. In addition, the experience of working there helped us to identify the main data sources. Because of our knowledge of the organization, it was not difficult to identify who ought to be interviewed and which documents were relevant, and more importantly, where they were located and who owned them. Furthermore, we developed an almost immediate rapport with the interviewees because they perceived us as their friends. As a result of the former links, senior management, including the director, were favorably disposed toward collaborating with the research.

Despite all the positive dimensions that stem from the familiarity with the country, culture and organization, there are still some limitations. Having worked at CFNCA might have created in us a predisposition or bias toward the political structure of the organization. Equally, it is possible that because some of the members of the organization were former colleagues, we might have held unconscious prejudices toward them. By the same token, it is possible that the interviewees might have thought: “Here comes the computer chap, playing the researcher role now.” We are aware of these limitations; however, we believe that the advantages of possessing knowledge of the prevailing culture outweigh the disadvantages. These circumstances were key for completing the hermeneutic circle in our interpretations. It is also clear that regardless of the type of relation between the researcher and the object of study, prejudices from both sides are unavoidable. Hence researchers engaged in this type of research should provide the readers with some assurance regarding the validity of their investigations. Klein and Myers (1999) offer a set of criteria that can be applied to gauge the validity of qualitative research in which interpretations are fundamental. They propose a set of six principles with which we can examine the validity of interpretive research. Table 2 shows how our research stands against such criteria.

the interviews were stored, organized and classified using a word processor, Microsoft Word (version) 6.0.

Table 2. Validation Criteria

Klein and Myers Criteria	Our Research
1. Contextualization To make sense, the interpretations require the historical and social context.	One of the authors used to work in the organization One of the researchers is a compatriot of the interviewees The historical and social context are presented in the results section
2. Interaction between the researchers and the subjects The subjects of the interviews are offering their interpretations of the phenomenon under study. The social interaction between researcher and interviewees influence the study.	Selection of documentary sources to complement transcripts of the interviews Recognition that the researcher drew upon his historical background in the selection of material and identification of sources
3. Abstraction and generalization The generalization of particulars to abstract categories; generalization to social theories.	The theoretical concepts are related to the field work through the interview guides and also are reflected in the discussion and implications The fieldwork illustrates the concepts of the adapted circuits framework The application of the adapted framework to the case study facilitated the generation of theoretical propositions about power and institutionalization of information systems.
4. Dialogical reasoning The confrontation of the original assumptions and preconceptions.	As the researcher used to work in the organization, the acknowledgement that the subjects could have had prejudices against the researcher and vice-versa. As this was acknowledged documents and observations were also conducted. The sharing of the preliminary case reports with informants. Informants provided their comments regarding whether our interpretations were biased or not. Their comments were incorporated into the preliminary versions of the case. The limitations of the theory and research approach are presented in the last section.
5. Multiple interpretations The relationship among context, power, social actions and intentions	The adapted Circuits of Power framework makes sense of why different actors may have different interpretations of the system. It explains multiple interpretations in terms of different identities, group membership and interests. The research involved different types of interviewees whose statements were complemented with data from other sources such as documents.
6. Suspicion The unravelling of distortions created by the political, social and historical contexts of the subjects	We focused on different types of subjects The research focuses on how different actors had different interpretations and how these reflected their particular interests

Case Narrative

Stage 1: Genesis of the system

The idea of the administrative information system began in 1990, triggered by a particular event. Because of the composite nature of the administration of CFNCA, clearance of accounts was not always a straightforward task. In 1989, an audit team from the U.S. government discovered anomalies in CFNCA operations that were financed by American funds, and vetoed payment for hundreds of thousands of dollars

that had been contractually agreed upon. The reason given by the auditors was that certain operations had infringed upon specific regulations, such as the purchase of computers from outside the U.S. and official travel using non-U.S. airlines. The deficit created by the refusal to clear those accounts was covered by AHS, the guarantor of the American government in research project contracts. To resolve the crisis, AHS appointed a new administrator for CFNCA. When the newly appointed administrator began his job, he had one main goal in mind: to eliminate the deficit by applying strict controls supported by information technology. The deficit was substantial and the cause was deemed to be CFNCA's unorthodox, almost maverick administrative practices. The administrative personnel told us, for instance, that quite often project managers would circumvent the formal administrative controls just to obtain faster authorization for their transaction requests. The administrator thought that a new information system would allow its department to incorporate tighter controls.

To develop the new administrative information system, the administrator needed the support of AHS. AHS was interested in the administrator's project, but the conditions for Washington's participation had yet to be defined. From the outset, AHS made it clear that they were prepared to pay for some equipment (the servers and the backbone of the network) and the salaries of those involved in the design and development of the system. The rest of the expenses, including PC clients, printers and basic office automation software, had to be covered with funds originating from research project budgets. The administrator offered his bosses in North America a reduction of the deficit by linking both budget and expenses. He pledged to incorporate into the system the AHS administrative rules, particularly those regarding the hiring of personnel and the acquisition of goods and services. The new administrative information system would force the researchers of the center to follow Washington's regulations, and AHS authorities welcomed this.

Besides his argument in favor of more strict controls, the administrator had another factor to support the approval of his project: he had a very good relationship with senior management in Washington. One former member of the administrative unit described it:

The administrator had a wonderful relationship with the bosses in Washington. I think that the main reason he was appointed to solve the mess in CFNCA was the result of being a very good friend of the senior administrator in Washington. They were schoolmates a long time ago in their home country in South America.

This boosted the administrator's credibility and was key for his getting the support to develop the system. Thus, for AHS the new system was a way to save money and to strengthen its control over CFNCA's operations. By early 1991, the administrator had AHS authorization to go ahead with the system, and its commitment to pay for a large proportion of the system's expenses.

However, the administrator also required the cooperation of the researchers, not only as prospective users but also as providers of the funds for purchasing the workstations. This was not an easy task. By 1990, research project managers had started to question the efficiency of the administration by comparing the contributions of their projects with the quality of the services received. When the administrator proposed the new information system, his unit was struggling to cope with the demands made by project managers. The limited memory of the old system, only 2MB of RAM, and its inability to deal with more than 24 users simultaneously, made the administration slow and

inaccurate in responding to project managers' requests for information and services. This hindered the execution of research projects and the possibility of achieving results within the stipulated timelines. A research project manager described this situation:

The former administrative information system was a real pain in the neck. We could not have information regarding the balance of our projects. We never knew how much money was available. Besides, the system was running all the procurement transactions, so whenever we needed stuff for our projects the administration department would take a long time before acquiring and delivering the goods. They would always put the blame on the lack of capacity of the computerized information system.

The administrator won the support of the project managers after persuading them that the new system would improve administration services, and most importantly by pledging not to raise the cost of their services. In this way, the administrator was able to obtain the support of the authorities as well as the cooperation of the researchers as sponsors and prospective users of the system.

Stage 2: Implementation, Disruptions and Resistance

The design of the system followed completely the guidelines of AHS and the funding agencies without consulting the users. One of the researchers complained about it:

In fact, I do not recall being called to talk to the designers or system analysts. I remember we were offered the system and we were asked to pay for the workstations with money from our projects. Yet, during the design phase, we were not consulted by the administration.

The designers made many consultations; but not with the end users. Instead, they consulted documents, managers in the AHS headquarters and donor agencies. One of the designers expressed his views about how they proceeded:

The head of the team was very clear in telling us that the most important feature of the system had to be the compliance with the rules and procedures of AHS and the major funding agencies. We had to spend a long time deciphering the meanings of the regulations to be able to implement those rules in the system. In many occasions when in doubt we phoned people from AHS and from the donor agencies.

The development of the system took a year, and its implementation, until the production stage in late 1992 (see Figure 4), took a further six months.

The new system had to achieve three objectives: (1) budget control, (2) financial transactions compliance with AHS and funding agencies regulations, and (3) enhancement of the administrative services provided to the researchers. Consequently, the system was developed with three main modules: budget control, accounting, and the automation of transactions. The main function of the first module was to ensure that each expense incurred by research projects corresponded to an entry in their annual budget plan. The second module handled operations such as payroll, check processing, balance statements, and the opening and closing of accounts. This module ensured that all these operations would comply with the regulations of both AHS and the funding agencies. The third module dealt with the automation of transactions such as the

acquisition of goods and services for the projects. The transactions supported by this module also included local and international trips, hiring and appointing personnel, transportation, printing, photocopying and purchase of equipment and office supplies. By virtue of the new system, researchers were no longer able to commit funds by informally contacting the personnel in the administration office. After the implementation of the system, any request for committing funds needed a hand-written authorization signed by three actors: the principal investigator, the administrator and the director of CFNCA. The idea behind the signatures was to make the researchers legally accountable for the transactions. The system helped CFNCA to achieve its first two objectives. Yet despite this success, the new strict controls brought in by the system did not speed up the delivery of administrative services.

The system design favored the control from the administration over the operation of the research projects control the finances of the Center, the system was institutionalized by 1996. It stressed strict financial controls that included manual controls for each transaction, and these were more important than the speeding up of the processes. Consequently, in order to buy a particular good, a research project manager, once logged onto the system, had to:

1. Access the system and input the request. The user must specify the details of the entry in the budget that will cover the expenses.
2. Print the requests. These requests must be signed by both the research project manager and the manager of the unit or department.
3. Once the document is signed and authorized, the user informs the system that the document containing the request has been fully authorized. The request then reaches an administrative officer (the control officer) who establishes whether the document is appropriately signed and whether the entry in the budget is valid. If everything is in order, then the purchase request will be processed.
4. Before the purchase is carried out, both the administrator and the director must sanction it by signing a document. The control officer will contact the supplier of the goods only after ensuring that the request and documents are in order; i.e. with all the required signatures and covered by a valid budget entry.

Thus, the purchasing of simple office supplies may require up to six signatures and could take three weeks for delivery. Moreover, the whole process depends almost totally on the discretion of the control officer. (However, as every transaction will follow AHS regulations, the administration ensures the clearance of accounts. This had created problems for research project managers who had experienced delays in the execution of their projects). One of them described his perception of the administrative information system and the control units:

The administrative information system gets stuck in the control units. Those are real bottlenecks. For example, when the document or order reaches one of those units, their personnel will usually say that the previous one did not do its job properly. Nevertheless, by the time they have made up their differences time has passed and we got delays.

One of our interviewees complained with some humor about the paradox that transactions made on a computerized information system had to be accompanied by signed pieces of paper:

I call the administrative system Jurassic Park because it is a system that creates and follows transactions only through paper. Those in the control units do not move anything without a written signature. The system is a step backwards.

Another complained about the number of signatures and waiting time for the authorization of requests: "... the problem with the administrative information system is the control units. For example, a purchase order can take up to 20 signatures. The last time I wanted to buy a stamp, it took me almost a week!"

By early 1993, the first version of the system was a source of tension between researchers and the administration. It did not achieve its third objective: the enhancement of the administrative services. In terms of requirements, the system was designed according to AHS' needs; however, it was disrupting the work of the researchers. Despite paying for and consenting to the new information system, research project managers complained about how the administrative tasks were taking away time could have been better spent on tasks directly related to the scientific nature of their projects. In addition, the researchers regarded use of the system as clerical in nature and not proper for their role as investigators. One of the support staff in the administration expressed it in the following manner:

Researchers are not going to sit down and use the system. That simply is not going to happen. They say that it is because they are busy and do not have time. Yet, for me they do not do it because they regard the operation of these systems as having a clerical nature. They would see the use of the system as something not in agreement with their positions.

Frustrated with the operation of the system, with its slowness and its failure to provide information for decision-making, the researchers openly complained during staff meetings, but to no avail. According to one researcher, the administration did nothing except take notes: "We constantly complained about the performance of the system and about the fact that we were not getting the promised better information and services. The administrator, though, seemed not to care..." Given the indifference of the administration, the researchers decided to express their discontent directly to AHS at its headquarters, and did so during a visit that two of the senior researchers made to Washington D.C. in the spring of 1993.

In addition to their complaints about the systems, the two hinted that researchers in CFNCA were very unhappy with the administrator. According to one interviewee, people in AHS paid attention and promised that they would take to the administrator. However, the researchers' concerns were never answered because though AHS called the administration to Washington, he simply explained that the complaints were a natural response to the newly introduced controls. One researcher recalled the events after the return of the administrator: "AHS, as expected, fully supported the administrator and did not do anything to resolve the problems with the system."

After his return from Washington D.C., the administrator continued with his implementation plan, and eliminated all parallel systems. Now, the only way the researchers could access their funds was through the new information system. As frustration grew, the researchers called an emergency meeting at the end of 1993. The meeting was long and heated, and the researchers told the administration that the

system was unable to deliver results on time and if the problems with the system were not going to be solved, they would go again to AHS. As a consequence, the administration created administrative assistant positions, which would operate the system and be funded with overhead costs. While not totally happy with that financial agreement, the researchers realized it was the only way they could make the system work in a way that would get them their funds without disturbing their jobs. In the meantime, before the formal hiring, staff from the administration would be deployed to the researchers' offices to operate the system.

By the end of 1994, there were a total of seven administrative assistants, one for each research department, fully funded out of research projects. Within a few months of beginning their work, they were the only ones who knew how to operate the system. One administrative assistant described her relation with the researchers and administrators:

The researchers do not use the system at all. They are not interested in the system, either in its operation or in its features. Any time they need something they would ask us to do it. We will operate the system and get the authorization from all the different actors.

The researchers were pleased with the presence of the administrative assistants. One research project manager expressed it this way:

My research projects would not operate without my administrative assistant. She does all the paperwork and looks after our financial transactions. Without her, I would have to do all the administrative chores and that would mean that I would have to work long hours dealing with administrative stuff. I would definitely hate that.

By 1996, the system was playing a fundamental role in keeping CFNCA finances healthy. The administrator and AHS were satisfied and often boasted that, without their intervention, CFNCA would have become bankrupt. One senior member of the administration described the impact of the system:

The administrative information system has been a complete success. Since its implementation we have not had any problems with our funding agencies and all the projects operate within the budgets. Each project is executed according to our norms and those from the donor. In fact we have received very positive feedback from AHS, they would like a system like this in their other research centers.

Stage 3: The System Becomes Institutionalized

In early 1997, after the hiring and training of the administrative assistants, the system was in full operation. CFNCA's employees had adapted to the system and no longer joked or complained about it, and for new researchers the system was transparent. We asked one of them to talk about the administrative information system: "To be honest with you, I do not know that much about the system. It is Clara [her administrative assistant] who knows more about it."

The system has experienced some technical problems, but these have been solved routinely without bringing its existence into question: the system has been fixed in the

circuits of power of the organization. On our last visit to the site in 1999, although the system had been transferred to the Windows NT operating platform, the design and procedures still remained the same and had become objectified in the procedures and manuals of CFNCA. These documents refer to the system as a given, as the way things are done. It has also become a fundamental part of the training of new clerical employees. All new clerical staff receive a copy of the system user's manual and take a course during orientation on how to use the system. We noticed that there are occasional instruction sessions in which employees are taught how to deal with new upgrades or modifications. The administrative information system has become embedded in the organizational structure of CFNCA and has become an unquestionable part of the organizational life; it has been institutionalized.

Analysis

Our first research objective was to adapt a framework to study power in the institutionalization of information systems. We present a summary of the adapted framework, in terms of its concepts and its relation to data in Table 1 and the logical relationships among the circuits in Figures 1 and 2. We applied these analytical tools to gather data and to compose the case study as presented in the previous section. The second objective was to demonstrate the explanatory power of the framework in an in-depth case study. In this sense, Table 3 presents an outline of how the concepts of the framework are linked to the case. Table 3 is based on Table 1, the first three columns – the circuits of power, their type of power, our interpretation of the concepts, and the associated research questions – are the same; the fourth column corresponds to the data we obtained from the case. Table 3 demonstrates how we interpreted the original framework and linked it to information systems institutionalization. Although illustrative, this table presents a rather one-dimensional view of the circuits since it does not show how they evolved through time. The remainder of this section presents a detailed analysis of each circuit and how it evolved through time.

We will carry out the analysis of the case by examining how each circuit of power became fixed and stable; that is how the information system its practices, associated meanings, regulations and techniques of production were integrated into the organization. Given that each circuit represents a different perspective of power, we will analyze each separately. Table 4 presents the state of each circuit of power throughout the three stages toward the institutionalization of the system: genesis, implementation and final institutionalization. After the analysis of each circuit, we will argue that a richer picture of power would require the combined view of the three circuits.

Episodic power

Figure 4 shows the chronology of how integration was achieved (Figure 4 is based on the data of Table 5). Integration has been categorized into either low or high, and the level of integration of each circuit is affected by the actions of the power players (i.e. the *As* and *Bs*), those involved in the episodic circuit of power. Episodic power will be integrated into the organizational practices when there is no substantive conflict and resistance; that occurs by 1995 after the hiring of the administrative assistants. The integration of the episodic circuit means that *A* does not have to exercise power over *B* because *B*'s conduct regarding the system was been converted into an organizational habit. Once the system was institutionalized, the administrator did not need to draw on

his resources or any disciplinary technique to ensure the compliance of the researchers, as the system had become an organizational routine.

In analyzing the power relations concerned in this circuit, it is necessary to distinguish the *As* from the *Bs*, their respective standing conditions, as well as the course of action that *A* wants *B* to follow. In this case, the *As* are the administration of CFNCA represented by the administrator, while the *Bs* are the researchers. The course of action the administrator wants the researchers to follow is to comply with AHS regulations, implemented via the new information system. This is an issue of power since the researchers would not have changed their maverick style of management without the administrator exercising causal power through the new information system. Moreover, it is an issue of power given the resistance posed by the researchers.

The standing conditions of the administrator were given by official authority delegated by AHS and by the close relationship he had with his bosses in Washington. The authority of the administrator was legitimate, as it was rooted in the statutes of CFNCA, which clearly stipulate that the Center has to be administrated by AHS. Besides, the administrator was also on good terms with senior management in Washington, a compatriot and friend of the central administrator. Hence the CFNCA administrator drew upon his authority and credibility to obtain the necessary resources to finance the system, to attain the support from the headquarters and, much more importantly, to legitimize his actions. As described by Beath (1991) in her research about top management support, the administrator was a champion who gathered support for his project by aligning the objectives of the system with those held by the authorities of the organization.

Table 3. The Circuits of Power and the Administrative Information System

Circuit	Type of power	Our Interpretation of the Framework in Terms of Research Issues	The Circuits of Power in CFNCA
Episodic	<i>Causal Power</i> When A makes B do something B otherwise would not do.	<ul style="list-style-type: none"> Who are the As and Bs? The identification of those promoting and championing the system and those who resist it. What are the particular objectives of As and Bs in their struggles relating to the system? What are the strategies and tactics adopted by As and Bs for the achievement of their objectives? What are the standing conditions of As and Bs? These should be given in terms of the positions hold by As and Bs in the organizational structure What are the resources that As and Bs have access to and employ in striving to achieve their objectives? 	<ul style="list-style-type: none"> The As are the administrator and the authorities in Washington, the Bs the researchers The As want to control and discipline the finances of research projects The Bs want to execute the funds of their projects without delay The As have drawn upon the administrative information system to discipline the Bs. The Bs have tried to outflank the As, specifically the administrator, by approaching his bosses in Washington, D.C. The As standing conditions are given by the rules and organizational structure of CFNCA as well as the contractual relations between donors and AHS. The Bs standing conditions stem from their obtaining the funding for projects and their reputation that allows them to be funded The As have the funds provided by AHS to develop the system. In this sense, the Bs do not have any formal resources to oppose the As
Social Integration	<i>Dispositional Power</i> It provides the conditions for As to exercise power. It is rooted in rules of meaning and membership of the organization.	<ul style="list-style-type: none"> What are the organizational rules and norms that place As and Bs in their respective positions? How will the institutionalized information system affect those organizational rules and norms? What are the meanings assigned to the information system throughout the institutionalization process? What are the rules and modalities of interpretation drawn upon by organizational members in making sense of the system? How would these modalities be affected by the institutionalized information system? 	<ul style="list-style-type: none"> The statutes and organizational structure of CFNCA The institutionalized information system will reinforce the current structures of CFNCA. That is the As controlling the administration and finances of CFNCA. For the As the system was associated with instilling discipline and bringing back financial health to CFNCA. For the Bs initially the system was regarded as disruptive The As interpreted the system in terms of control. The Bs interpreted the system in terms of efficiency The modalities of interpretation remained the same, if not reinforced after the institutionalization of the system. This is because the system did not modify any of the standing conditions of both the As and the Bs
Systemic Integration	<i>Facilitative Power</i> This power is fruitful in the sense that it induces the organization to generate outcomes. It is defined by the techniques of production and discipline of the organization	<ul style="list-style-type: none"> What are the techniques deployed by A to ensure and monitor B's compliance? What are the work tasks that are affected by the new information system? The work tasks before and after the institutionalization of the system. How can the system be set up as a resource to instill discipline? 	<ul style="list-style-type: none"> The As defined the administrative information system as an obligatory passage point for the Bs; without using the system, the Bs could not execute their projects. Likewise, the system itself had inscribed the regulations that the As wanted the Bs to follow. Thus by virtue of the system the As were ensuring the compliance of the Bs with the formers' objectives. The work tasks affected by the information system were the administrative, financial, accounting and procurement practices. Before the institutionalization of the system those practices were executed almost at the discretion of the researchers. After the institutionalization of the system those practices were conducted according to the As' regulations. Indirectly, the system had a negative effect on research tasks made the researchers to dedicate time to use the system. This was solved by the hiring of the administrative assistants. The system was purposefully deployed to instill discipline in the Bs' administrative, financial, accounting and procurement practices.

Table 4. The Circuits of Power and the Institutionalization of the System

Stage	Episodic Circuit	Social Integration	Systemic Integration
Stage 1 Genesis of the System	A makes B use the System. The Administrator makes the researchers change their managerial practices. Without the intervention of the administrator the researchers would have not changed their practices by using the system.	A's dispositional power is given by the rules of meaning and membership. The administrator was able to develop and implement the system because he was in a position of authority and had a good relation with AHS. Besides the system was deemed to help AHS to control CFNCA.	A's facilitative power is given by techniques of discipline and production. The success of the administrator's project was facilitated by the way CFNCA operates its projects; that is all the project funds are fully controlled by AHS through the administration. Researchers could not access the funds without the control of the administration.
Stage 2 Implementation	The administrator cannot make the researchers to use the new system. CFNCA creates the position of the administrative assistants. These become the agents of the researchers and eventually become users of the system in the end.	Social integration is disrupted as the researchers regarded the use of the system as a waste of time and as having a clerical nature. Social integration is achieved by the administrative assistants role. It was legitimate for them to attend training sessions and to operate the system.	Systemic integration is disrupted because the system's procedures were in direct contradiction with the working practices of the research project managers. Systemic integration was achieved when the administrative assistants arrived. In this way the working practices of the researchers were not disrupted and the original processes embedded in the system remained intact.
Stage 3 The system is institutionalized	Episodic power ceased (no As were making Bs to do something Bs would not otherwise do). Now there are only routines that people in the organization execute as part of their organizational life	The information system as institutionalized reinforces the rules of meaning and membership of the organization. Administrative tasks are performed by clerical employees. It is a source of dispositional power as it empowers the administration and the administrative assistants to deal with the details of the execution of the projects. It boosts the dispositional power of AHS and the administration since the system legitimates their intervention in the Centre	The institutionalized information system has become a fundamental technique of production in the organization. Without it, projects could not be executed. It has also become a technique of discipline since it is the means by which AHS and the administration control the finances of the projects. It is a source of facilitative power because the system allows the organization to operate, and AHS to control it, without interfering with the work of the researchers.

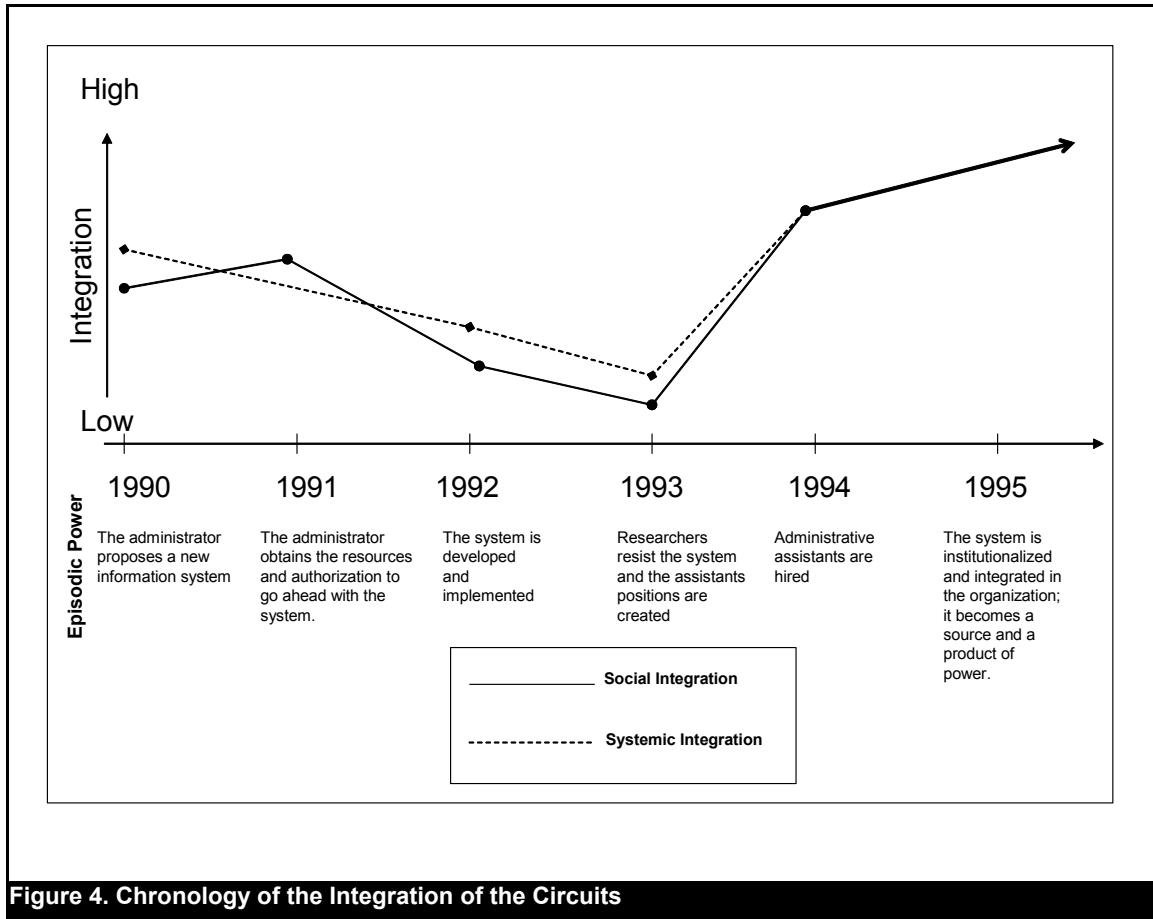


Figure 4. Chronology of the Integration of the Circuits

The standing conditions of the researchers stemmed from their core activity of research. Their initiatives and reputations had attracted the financial resources that had funded CFNCA operations throughout its existence, and this was their main source of power. However, they lacked the formal authority of the administration to withhold funds, and consequently did not have any right to ignore controls within the Center. The researchers could not access their funds without passing through the administration division. Moreover, unlike the administrator, they did not have any formal lines of communication with Washington. Figure 3 shows the lines of command according to the organizational chart. Furthermore, the researchers were not as well organized as the administration. They usually worked independently and concentrated mostly on their individual projects. The administrator and his division, on the other hand, were cohesively organized in a tight hierarchy. Thus, the cohesiveness of the administration division, plus the formal authority, as well as his close relations with AHS gave the administrator stronger standing conditions than those of the researchers. Eventually, the causal power exerted by the administrator over the researchers was effective in curbing the researchers' initial resistance. Nevertheless, as discussed below, the institutionalization of the system cannot be understood simply in terms of the relations between *As* and *Bs*, it requires the complement of the other two circuits.

Table 5. The Circuits of Power and the evolution of administrative information system

Circuits of Power	1990	1991	1992	1993	1994	1995-1996
Episodic	New administrator proposes a new information system.	The administrator obtains the resources and authority to develop the system.	The system is developed and implemented.	The researchers resist the system. They express their frustration to the administrator and complain directly to AHS. The position of administrative assistants is created.	Administrative assistants are hired.	The system is institutionalized, it is integrated in the circuits of power of the organization and it is the product of power and a source of power.
Social	To AHS the system is presented as a tool for control and for the researchers as a tool for efficiency and source of information.	For AHS the system will be a tool to reduce losses as the result of tighter controls. The researchers look forward to a more robust system.	The researchers were not consulted either for the design or for the development. AHS was consulted throughout the whole process.	AHS fully supports the administrator. The researchers regard the system as non-sense, a joke and as a threat to their identity, since it is clerical in nature.	The system is no longer regarded as a nuisance. Researchers and AHS are satisfied with the system.	The system defines new roles in the organization.
Systemic	The current system fails to cope with all the demands given its weaknesses.		The system is designed and developed completely following the regulations of AHS. It disturbs the tasks of the researchers	The administrator eliminates parallel systems. The only way to access funds is through the information system.	The system is in full operation. The losses are cut and the researchers can access to their funds without taking time out of their tasks.	The system is embedded in the tasks of the organization and it is a fundamental instrument for AHS to control CFNCA.

Social Integration

The main task in this part of the analysis is to identify the rules of meaning and membership that are related to the information system (see Table 3). For the administrator, the rules for interpreting the system were based on control, while for the researchers they were seen in terms of efficiency. Regarding the rules of membership, the researchers associated the operation of the system with clerks, whereas the administration believed the system should be used by the researchers. Social integration could be achieved as long as the system did not contradict those rules. But the first

version of the system did result in contradictory meanings among organizational members, as it was designed to reflect the requirements of the administration instead of the users. Hence, the researchers' initial rejection. Conversely, the system was a complete success for the administration, as it was the instrument for enforcing the stricter controls that eventually reduced CFNCA's deficit. Moreover, it was a feather in the cap of the administrator who was regarded in Washington as the one able to restore order in CFNCA.

In terms of meanings, then, for the administration the system was an instrument to improve organizational performance, while for the researchers it was a nuisance that slowed down the running of their projects. This tension, originating in contradictory interpretations of the same system, was resolved by hiring administrative assistants. This was fundamental for the social integration of the system, as it impacted the original meaning assigned to the system. It changed the researchers' early interpretation of the system from being an obstacle, an imposition from AHS and a joke, to becoming an almost invisible tool crucial for the operation of the Center.

As pointed out in the theory section, to achieve social integration an information system would also have to be aligned with the rules of membership of the organization. Since the researchers interpreted the operation of the system as clerical, they were not keen on being associated with it. This objection dissipated when they delegated the use of the system to the administrative assistants. The researchers' interpretation of the system did not change, but as long as it was operated by the assistants they did not complain. The researchers' rejection of the system on the grounds that it contradicted the nature and tasks associated with their particular profession coincides with what Bloomfield and Coombs (1992) found in the British National Health Service (NHS). They found that physicians resisted the use of an information system that required them to input data, as this task was thought to be associated with nurses' duties. As did the researchers of CFNCA, doctors regarded the use of the information system as an affront to their professional identity. Thus, social integration would not have been achieved without delegating the operation of the system to the administrative assistants. It meant that the professional identity of the researchers remained unthreatened.

Systemic Integration

The first version of the system did not reach systemic integration either. Initially, the system contradicted the current practices for committing the funds of research projects, introducing more formalized and bureaucratic procedures where project leaders were previously able to directly (access the services of?) the administration clerks. The new system became an obligatory passage point (Callon, 1986) for the researchers whenever they wanted access to the funds of their projects, but one that seriously disrupted the working practices of CFNCA. Tension resulted when the researchers demanded the system be changed. At the same time, the administrator did not want to alter the processes embedded in the system because they were the conductors of the necessary AHS control measures. This tension was the origin of the need for the administrative assistants' positions.

The administrative assistants become the buffers between the researchers and the administration division of CFNCA, and this was the solution for integrating the system into the work tasks of CFNCA. The assistants both ensured that the strict financial controls remained in place and freed the researchers from administrative tasks so they

could concentrate on their research projects. Although the system, in terms of software and procedures, remained the same, it reached systemic integration because the administrative assistants freed the researchers from all administrative tasks. In this sense, the system was transformed when its intended main users changed. Thus, systemic integration was achieved by the introduction of the administrative assistant position since it allowed the main productive task of the organization, research, to remain undisrupted.

Achieving systemic integration does not mean that the new information system leaves the working practices of an organization unaltered. Our data shows how the system instilled discipline in the administrative practices and enhanced control from AHS. The net result was that, after the introduction of the administrative assistants, researchers continued doing their research, and AHS ensured that the Center would have healthy finances. However, it raised the costs of doing research because the Center had to pay for the assistants. In addition, the presence of the assistants increased the bureaucracy and size of the organization, and the researchers had to accept this situation as the circuits of power of the Center favored the standing conditions of the administration.

The three circuits

Explaining the institutionalization of the system from the perspective of a single circuit would have given us an incomplete account. If each circuit were a lens, when used individually it would only reveal one dimension of power. However, the combination of the three circuits provides an enhanced view, as happens when a collection of lens filters are superimposed. The episodic circuit, by its emphasis on action and causal power, would have provided an explanation based solely on events. Thus, we would have learned about the conflict resulting from lack of user consultation and poor design. Such conflict has already been documented in our field (Mumford, 1987; Davis, 1989). Although illuminating, these theories do not tell us why, despite the lack of participation and poor design, the system is accepted and later institutionalized. A likely explanation is politics, but politics in this sense is regarded as the illegitimate side of power (Mintzberg, 1983; Hirschheim and Klein, 1994) consequently it is black-boxed, with the result of hindering our understanding of power.

Keen (1981) identified the need to unscrew the black box of politics in his classic paper on organization and change. There he urged researchers in our field to conduct studies to shed light on such a complex phenomenon:

Unfortunately, 'politics' have been equated with evil, corruption and, worst of all, blasphemy in the presence of the Rational Ideal, but politics are the process of getting commitment, or building support, or creating momentum for change; they are inevitable...It is absurd to ignore it...A political perspective on information systems is needed in research. It will of necessity be based on comparative field studies that illustrate theoretical concepts...It can immensely add to our understanding both of the implications of information technology and the dynamics of effective implementation.p.31-32

By considering the other two circuits, we can complement the episodic account of power and open the black box of politics. Thus, it was his close relationship with senior AHS management (politics) that led the administrator's view to eventually prevail. The circuit

of social integration allowed us to identify the administrator's sources of power: being appointed by AHS and by enjoying the friendship and trust of senior management in the headquarters. Moreover, the circuit of social integration allowed us to identify that one of the roots of resistance and conflict was the meaning assigned by the researchers to operating the system. They felt that operating the system undermined their status as researchers. The circuit of social integration, then, helps to explain why one party resisted and why the other prevailed.

Systemic integration was also key to complete the picture of power. It highlighted both the failure of the system to deliver value to the main users, and its success for the administrator in controlling CFNCA's operations. Since the system was a vital instrument for achieving the objectives of those in power, the disruption was corrected not by modifying the essence of the system, but by adding more intermediaries to the system, in this case the administrative assistants. Thus, the circuit of systemic integration allowed us to explain why a disruptive system becomes institutionalized. In this case the disruptions were compensated not by modifying the software, but by adding more staff.

In sum, we have analyzed each circuit and supported with evidence our argument that for a system to be institutionalized it requires the integration of the three circuits of power. Causal power is exercised by *A* when *B* is resisting. Institutionalization is achieved when the system is no longer contested and it has become a routine in the organization. We have argued that resistance will arise when the system is perceived as a threat for the users or if it disrupts working practices; and will continue to be resisted as long as it does not achieve social and systemic integration. We also have shown that by looking at the three circuits of power we enrich our understanding of power relations in the context of the institutionalization of an information system. In the next section we discuss the implications of our research.

Implications

We will first discuss the theoretical implications of our research and put forward a set of propositions derived from applying the framework to our case that are aimed at theorizing about the process of institutionalization and its relation with power. Second, we will articulate implications for practitioners and suggest some ways in which the framework can be applied. The section concludes by discussing the limitations of our research.

Theoretical Implications

The Circuits framework has been applied to the study of power and information systems elsewhere (Introna 1997; Silva and Backhouse 1997), however, these works draw on secondary data sources to study a system in a short period of time. Our research, on the other hand, applies the framework for gathering and analyzing data in a longitudinal study. Jaspersen et. al. (2002) underline the benefit of longitudinal studies for research on power since power relations and their effects require a longer span of time to be identified. Our research is also different, as it applies the framework to an institutionalization of a system rather than a failure.

Our main theoretical contribution is the adaptation of the Circuits framework so that it can be applied by other researchers interested in studying power. Barnes (1990) notes that one of Clegg's limitations is that he does not make any link between theory and

data, a limitation for researchers intending to apply the framework. In this paper, we interpret and adopt each of the concepts from Clegg and we link them with the data required for studying information systems and power (see Table 1 and Table 3). Given the lack of studies in our field that integrate different views of power (Jasperson et. al., 2002) this is a relevant contribution. As we have argued in the previous section, the integrated view of power brings about the identification of its different elements that otherwise would escape analysis. This approach makes it possible to propose a concrete connection between the framework and data, and accordingly we have formulated three theoretical propositions about power and institutionalization.

1st Proposition: The regulations and rules inscribed into an information system that has been contested will favor the interests and goals of those who during the struggles held the strongest standing conditions

The Circuits framework also calls our attention to apply a counterfactual proposition as a means of analysis to learn about power relations in an organization. In other words, in examining a system, we could say that the regulations and rules the system embodies would not have been there without the exercise of power; especially if the system has been previously contested. In our case, it was clear that the regulations and rules automated by the system were directly dictated by AHS. Had the researchers been effective in rejecting the system, we might argue that the system would have had different regulations, favoring the managerial style of the researchers. Thus, an implication of our research would be that practitioners and researchers can learn a great deal about the power relations of an organization by looking at who “owns” the rules and regulations of the system.

This proposition has been addressed by researchers of information systems, particularly in the Scandinavian tradition. This tradition, and specifically the collective resource approach, assumes that often the development of organizational information systems is an arena in which two groups of stakeholders meet and in which the interest of one group, that of management, prevails over the other group, workers (Bjerknes and Bratteteig 1995). To paraphrase this relationship in episodic power terms, managers (As) make workers (Bs) use a system that, given the chance, the workers would reject.⁹ Our research, then, is complementary to the observations made by Scandinavian researchers – specifically with the collective resource approach – in the sense that information systems reflect the power relations prevailing in the organization. As a corollary, proposition one suggests that the Circuits framework can be used in the post-implementation phase to evaluate the power conditions in which the system was developed. In our case, the information system represents the power relations between administrators and researchers since it has inscribed the regulations and controls specified by AHS.

This proposition is also related to the Socio-Technical approach to developing information systems that focuses on job satisfaction. In discussing critical issues to assure the integrity of information systems, Mumford (1983: 26), one of the main exponents of this approach, suggests that the exercise of power can result in an

⁹ Given this situation Scandinavian researchers have argued in favor of a democratic approach to develop information systems that reflects equally both parties' interests (Bansler 1989; Livari and Lyytinen 1998).

information system having a one-sided influence. To eliminate power and its related biases, Mumford advocates for users' participation and for the presence of a facilitator.¹⁰ Although desirable, a power-free situation may be difficult to achieve given that, in discussions and negotiations, different stakeholders bring to the table different identities and opposing interests (Callon 1986). This shortcoming of the Socio-Technical approach was previously pointed out by Hirschheim and Klein (1994: 85): "We believe the main weakness of participation programs has been that they failed to take into account the political background constraints that most clearly manifest themselves in the institutional-legal context in which organizations operate." The essence of proposition one is to identify both the political background in which an information system is conceived, developed and implemented and how this political background is reflected in the system itself; hence the contribution of our proposed framework to the Socio-Technical approach.

2nd Proposition: In a contested system in a non-profit organization, contradictions between working practices and the system will be resolved by adding bureaucracy specifically if the rules inscribed on the system reflect the goals of those in powerful positions

While the administrator was not keen on watering down the controls of the system, but he acknowledged that it was getting in the way of the researchers, and alleviated their workload by adding administrative assistants, or more bureaucracy. The implication of more bureaucracy for resolving contradictions between working practices and the system has to be qualified by the fact that our research was carried out in a non-profit organization. In a for-profit organization, considerations about costs would probably have been more significant in deciding whether or not to hire the administrative assistants.

Our theoretical framework, and in particular this proposition, explains why systems that are purposefully deployed by management to change working practices may result in creating new positions and incurring unexpected costs. Our case illustrates how the exercise of power and the unwillingness to change requirements had a price for the organization.. Our theory explains this in terms of the system failing to achieve either systemic or social integration. This we argue is what occurs with ERP systems, which are deployed with the purpose of profoundly changing working practices. Research has documented how their costs escalate, as their successful implementation needs the addition of consultants and intensive training for existing personnel (Hitt, Wu et al. 2002).

However, it is worth distinguishing on ERP implementation from what occurred at CFNCA. In the former, extra personnel and intensive training may signal poor systemic integration, while in the latter the positions of new administrative personnel were critical for the system to achieve institutionalization. This is an important distinction as extra consulting and intensive training may not guarantee institutionalization of an ERP implementation. Hence a corollary of this proposition suggests that the presence of unplanned consultants and intensive training throughout a system implementation is indicative of weak systemic integration, not a sign of future institutionalization.

¹⁰ Hirschheim and Klein (1994) observe the similarity of this condition regarding the absence of power with the ideal speech situation proposed by Habermas (1972).

3rd Proposition: The institutionalization of a system would be undermined if there were disruptions or contradictions that would disturb the circuits of power:

As reported in the case, after the hiring of the administrative assistants the system still experienced disruption. These were mainly technical and occurred when the system was moved to the Windows NT platform. That was in 1998 and during that time the system broke down with some frequency. However, the disruptions were neither so critical for the system to be regarded as a threat to the identities and interests of the organization nor so serious that its productivity was questioned. The circuits of power remained integrated and the system remained institutionalized. This is not to say that the institutionalization of a system lasts forever, as a serious disruption or a change in the nature of CFNCA's work could have brought about questioning of interests, identities and productivity. In such a hypothetical situation, the circuits of power would have been open to scrutiny and the institutionalization of the system would have been undermined. It follows then that if managers (or others) would like to de-institutionalize a system, they would have to disrupt the circuits of power.

The institutionalization of a system entails its routinization, and once this is achieved it becomes taken for granted, and goes to the background of the organization (Kling and Iacono, 1989). When breakdown occur, however, the system comes to the foreground and is no longer taken for granted.¹¹ If the interruptions are so frequent that they disrupt the working practices of the organization, the systemic circuit of power will become unstable, which will impact the circuit of social integration by altering the meanings assigned to the system. A corollary of this proposition is that tolerance of failure will be a function of power: the degree to which disruptions will be tolerated is inversely proportional to the causal power of whoever is affected by the fault. In our case, when the interruptions were affecting exclusively the administrative assistants, the tolerance was greater than when the interruptions affected the researchers or the administrator. Hence the framework can be applied as an analytical tool for studying the political connotation of failures and faults since it provides an explanation of why there are different levels of tolerance.

In considering the de-institutionalization of a system – that is what we suggest will gradually occur if one of the circuits of power becomes unstable – we need to consider not only the magnitude of the system but also the time that it has been institutionalized. This is clearly explained and illustrated by Kling and Iacono (1989). These authors' work suggest that large and expensive systems in which organizations rely on core productive practices and that have been in place for long time will be very difficult to de-institutionalize. At the time Kling and Iacono (1989: 9) wrote their paper the Social Security Administration (SSA) still had an old autocoder system to produce 40 million checks per month: "The SSA has tried to overhaul the payments system at least three times in the last 15 years without success...the persistence of the SSA's outdated payments system architecture from the 1950s indicates that large scale CBIS

¹¹ This proposition is linked to what Winograd and Flores (1987) suggest occurs with information systems and information technology. Although Winograd and Flores refer to IT as a tool and not as an institution, we believe this is a valid comparison since what we are referring to here is the systemic integration of the system; that is mainly how its technical dimension fits with the organizational productive practices.

[Computerized Based Information Systems] can be exceptionally difficult to replace." Thus, disturbances in the circuits of power may indicate the beginning of a system's de-institutionalization, but by no means signal its imminent demise.

Implications for practitioners

The relationship that we have established between the institutionalization of an information system and the circuits of power of an organization is a theoretical construct that can enrich practitioners' understanding of systems implementation.¹² Specifically, our contribution consists of articulating a theoretical framework to make sense of the political issues involved in the institutionalization of a system from its conception to its routinization. In addition, this paper illustrates the explanatory power of the framework by providing an empirical account of how a system reaches institutionalization. Practitioners can draw on the Circuits framework to determine the actions and resources, either material or discursive, needed for a system to attain institutionalization. The strategic view of power brought about by the Circuits framework becomes relevant when managers are purposefully not looking for consensus, as in situations where they want to bring about radical organizational changes.

Managers and information systems practitioners can use the Circuits framework to assess and estimate the political feasibility of an information system project. In formulating an implementation strategy, practitioners can use the framework to incorporate a political component. They can use each of the circuits and its concepts as a checklist before embarking on an information systems project. Each circuit should be examined in detail (the questions outlined in Table 1 could be used as a starting point). Any strategy for implementation should aim at achieving high levels of social and systemic integration. Conversely, as hinted in the previous section, the circuits can also be used as a guide when managers would like to de-institutionalize a system. They can identify the circuits of power that sustain the system and then formulate strategies that would undermine those circuits and consequently produce its de-institutionalization.

By looking at the concepts of the episodic circuit, practitioners may evaluate their standing conditions and those of other stakeholders before engaging in a project, enhancing the likelihood of having a successful implementation. In short, if the standing conditions of the champions of the system are not favorable, the political feasibility of the project may be questioned. It is important for practitioners to project clearly the desired outcomes of the system's stakeholders. Practitioners may use the interview guides and concepts of Table 1 to elicit the goals of each party involved in the system. If contradicting goals are identified, then careful attention to the other circuits of power is required.

The concepts of the circuit of social integration draw attention to the rules of meaning and membership. This will be particularly useful when looking at discourses of

¹² Although not in the same exact terms, institutionalization has been previously discussed in the implementation IS literature. For example, Cooper and Zmud (1990) consider institutionalization as the routinization of an information system and Orlikowski (1992) refers to the institutionalization of an information system as the incorporation of its associated repeated practices into the structural properties of organizations. Kling and Iacono (1984) highlighted the political impacts of an institutionalized information system as a factor for altering resource allocation and status within an organization.

legitimation related to the system. These discourses are fundamental for enrolling other stakeholders whose support is deemed crucial to the success of the system (Callon 1986). Without legitimation, an information system would likely not receive support, and therefore would not achieve institutionalization. Moreover, by drawing on the concepts of social integration, practitioners may project the meanings a new system may have for its prospective users. If the system has negative connotations for the users, managers and analysts may take actions to either modify the system or work with the users so the negative meanings are dissipated. Again, the concepts of Table 1 and the data collection guide can help practitioners in their attempt to elicit the elements of the social integration circuit.

The concept of systemic integration can also be of relevance for practitioners. The successful implementation of a system requires considering the disciplinary techniques that would accompany it. This is particularly relevant in contested systems, especially where the system is weak in social integration. In our case, the administrator eliminated alternative means of accessing funds and left the system as the only way to do so. This was key for casting the system as an obligatory passage point (Callon, 1986), since the funds were fundamental for running research projects. We are not proposing that this should be replicated; what we are suggesting is that practitioners need to think of ways they can establish the systems as obligatory passage points for the users. In addition to disciplinary techniques, systemic integration relates to how the system's rules impinge on working practices. By looking at this relationship, practitioners may reflect on the effects of modifying current working practices to serve the purposes of whoever owns the system. In our case, the information system was effective as an instrument for instilling discipline.

Finally, the strategic nature of the circuits may somehow suggest a Machiavellian approach to implementation. This is unavoidable given the intellectual thrust of the framework, a strategic conception of power that emphasizes alliances and that actors in an organization will have different interests and contradicting interpretations of the same actions. This was demonstrated in the case by the administrator's and researcher's different maneuvers, each pursuing different interests. In this sense, practitioners need to reflect on the ethical consequences of using the framework. Professionals have the obligation to act responsibly so they do not exploit people as a means to achieve goals. This is an obligation for whoever is thinking about articulating a political strategy; a challenge that practitioners must address when contrasting their political strategies and objectives with the code of ethics of their profession. The Circuits framework is a powerful instrument that requires ethical consideration and reflection.

Limitations

We found at least three limitations in our adaptation of the theoretical framework. One is its complexity, manifested in the large amount of data that must be gathered in order to depict the circuits of power of an organization. And this relates to the second and third limitations. Second, while Clegg's original framework includes an environmental component, our adaptation of the framework does not account for the influences of the power that come from the environment. We choose not include environmental factors to avoid escalating the complexity of the framework, but we did incorporate the data into our case so we could compose a coherent narrative.¹³ Specifically, we were able to

¹³ Clegg (1989) calls this factor exogenous contingencies. In the Appendix that contains our

discover that the changes that brought about the new administrative system were triggered by a financial crisis in CFNCA after an external audit. The incorporation of the environmental factors into the framework could well be an area in which further research can be conducted. This would extend the scope of the framework to the area of interorganizational power.

The third limitation in our proposed framework concerns our interpretation of facilitative power. In discussing the circuit of systemic integration, Clegg indicates that new techniques of production -- besides any disciplinary qualities-- will also empower and disempower different organizational members. However, instead of focusing on this duality, in this paper we emphasized the disciplinary aspects of facilitative power. The main reasons for this were twofold. On the one hand, as mentioned above, we wanted to keep the complexity of the framework manageable and, on the other hand, the analysis of our data indicated that the most salient attribute of facilitative power shown by the administrative information system was its disciplinary character. Nevertheless, we believe that the empowering/disempowering feature of IS is a topic that researchers in our field may be interested in exploring further. In addition to the limitations of the adapted framework, our research approach brings about a couple of challenges worthy of discussion.

There is a limitation in our discussion of episodic power. In analyzing the initial resistance to the system, we observed that it would have been rejected because of its poor design and lack of user involvement had it not been for the support of the administration and AHS. We based this interpretation on our data and on established IS research on participation and acceptance models (Mumford, 1987; Davis, 1989). However, we are not implying that those are the only factors that would explain users' resistance when analyzing the circuit of episodic power. In her classic paper about power and politics, Markus (1983) observed that the rejection of a system cannot be explained only in terms of poor design or attributed to particular characteristics of the users.¹⁴ In our research, both the theoretical framework and the case study concur with Markus' theory, in the sense that a one-dimensional view of resistance does not fully account for the complexity of power relations unleashed in the adoption of information systems. Nevertheless, more detailed fieldwork is needed to identify other factors for making sense of users' resistance -- we have only identified two -- and the focus would be on the episodic circuit.

Two of the strengths of interpretivist studies are that they allow an in-depth analysis of stakeholders' motivations and intentions and that they link context to organizational processes (Walsham 1993 and 1995). In spite of this, findings of these studies cannot be generalized to populations of organizations, and as such, our research cannot be used to characterize any type of organization. Our results are circumscribed to the adaptation of the theory, its testing, and the provision of analytical insights. As intimated above, one of the limitations of the study is that the organization studied was a non-profit one. This is a relevant consideration given that its nature permeates not only the structure and governance of the organization but also its culture and values. These are fundamental elements when studying power. In this sense we may speculate that in an

interview guides we incorporated questions regarding the exogenous factor; see under the heading: "Exogenous Contingencies".

¹⁴ As an alternative she proposed what she called a theory of interaction. This theory explains resistance in terms of the interaction between the system and characteristics of the users.

organization of different nature, users, managers and shareholders would not have been that patient with the shortcomings of the system. Nevertheless, the study is still relevant in learning about the concepts of the framework and the dynamics of non-profit organizations.

Another limitation of our approach is that in order to conduct a study of this nature, researchers are required to develop a strong rapport and trusted relationship with their interviewees. There are ethical issues here that need careful attention. The researcher should inform his interviewees about the purpose of the research, even though this may inhibit their responses. Senior management may not consent to a study that asks questions about the power relations of the organization. In this particular case, we were very fortunate that the authorities of the organization agreed with the research once they were ensured of anonymity. Another limitation of our study is the length of time required to conduct the fieldwork. To study institutionalization it is necessary that the researchers have a particular system under their observation for an extended period of time. For this particular research we were privileged with permission to study the system for about six years. That may be difficult to emulate in other circumstances.

Conclusion

In conclusion, as acknowledged early on by Keen (1981) and recently confirmed by Jaspersen et. al. (2002), the study of power is fundamental to understanding how information systems are adopted and used in organizations. Its study is difficult not only because of its elusiveness (Jaspersen et. al. 2002: 398) but also because of its connotation of evil and corruption (Keen 1981: 31). Hence, research on power presents both a theoretical and an empirical challenge. This paper is a contribution in those two senses. On the one hand, it provides a theoretical framework to analyze the different dimensions of power, and on the other, offers an empirical study that details the process of institutionalization of an information system from the point of view of power. However, its main contribution consists in stimulating further research on this elusive and still not fully understood phenomenon.

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APPENDIX

Interviews and data collection guide

The collection of data for this research has been guided by the six main elements of the framework described above (outcomes, exogenous contingencies that introduce change in the organization, episodic circuit, social integration circuit, system integration circuit and obligatory passage points).

General Topic Guide

- Research the history of the organization. Focus particularly on the way it usually has adopted innovations such as information systems.
- Interview people from different levels. This is fundamental. If there is no access to senior management and employees, the analysis will lack depth. It would be relevant for the study if one can interview people that no longer work in the organization as they are outside the scope of action of powerful organizational agents.
- Do not tape the interviews. People might hold back if they know they are being recorded, especially if the conversation centers on the politics of the organization.
- To allow the interviewees to expand their views it is important to use a semi-structured type of interview. Ask them to tell a story regarding the information system. Ask for examples: Would you tell me the how this information system was developed or implemented? Emphasize those issues regarding power and information systems. At the end ask the interviewee for a theorization about the facts. This is very important because in this part the interviewees tell their own interpretation of the story.
- Analyzing documents is also relevant. Particularly those regarding the information systems, such as announcements or training documents. It is also important to identify who attended launching or introductory meetings and to inquire about the reactions of the participants.

- It is important to have a facilitator or sponsor within the organization who understands and gets along well with the researcher, so he or she can help in identifying interviewees or documents.
- It will be relevant if the researcher can participate as an observer in meetings regarding the information system. This allows the researcher to grasp the informal dimension of the site.
- It is important for the researcher to show a neutral position, particularly in conflict situations. Interviewees should not perceive that the researcher is collecting information to favor any of the parties in conflict.

INTERVIEWS AND DATA COLLECTION GUIDE FOR IDENTIFYING EXOGENOUS CONTINGENCIES

- Look at the history of the organization and its mission.
- Identify the position of the organization within its context (e.g. Is the organization among the leaders of its industry?).
- How has the organization adapted to previous information systems or innovations?
- Describe how the institutionalization was carried out.
- Was the institutionalization the result of coercive forces, such as legislation or regulations?
- Was the institutionalization the result of mimetic forces? Was the information system adopted as a reaction to uncertainty or imitation because it was successful in other existing organizations?
- What variation in the environment of the organization brought about the introduction of the information system?
- What changes in the environment of the organization favored or impeded the introduction of the information system?

Interviews and data collection guide for *the circuit of social integration*

The identification of this circuit is concerned with the norms, rules of meaning and membership that prevail in groups within the organization. These norms and rules allow the existence of agents' networks that are created through the process of sociological translation (Callon 1986 and 1987; Latour 1987). To identify this circuit, the researcher should ask questions such as: What is the relationship between the information system and groups (in terms of their participation to sustain or to disrupt the information system)? What are the norms that define those groups? What are the membership rules? It also will be important to establish how these rules and norms are adopted and sustained. In doing so, the researcher should look at the relationship between this circuit and the environmental contingencies. This will allow the researcher to determine the stability of the norms and the potential influence of the environment over the social integration circuit. Issues to focus on include:

- Determine the formal and informal structure of the organization.
- Identify possible points of strain between the information system and the institutional order within the organization. Look for change in meanings; if there is contradiction then tension will be unavoidable.
- If the new system bring about new rules and meanings these may threaten the established order. This is important because it shows that the introduction of information systems, if successful, can transform the current order.

- Has there been any recent change in the group norms or meanings? What was the cause of this change?
- How was the adoption of the information system interpreted? Who set the interpretation rules?

Interviews and data collection guide for the circuit of system integration

The researcher should identify here the technological and material conditions prevailing in the organization. This will imply establishing the techniques and knowledge required to produce the outcomes and the mechanisms of control and discipline exerted over the physical and social context of the organization. The researcher should ask questions such as:

- How are the members (groups and individuals) of the organization achieving their goals?
- What are the material resources, techniques and skills that organizational members require to perform their tasks?
- What are the mechanisms of control and discipline exerted over the organizational members when they perform their activities?
- Why are particular innovations adopted?
- Who are the organizations or institutions that are influencing the adoption of the new technology?
- Who benefits? Answering these questions will allow the researcher to identify how the environment influences organizations. Thus, the researcher could anticipate what changes in the environment might have an impact on the system integration circuit and therefore on the organization.
- Describe the role of the information system in the exercise of power (control or surveillance or as an automation tool, i.e. technology for increasing production).
- What other resources were deployed along with the information system to achieve the outcome?: Threats, discourses (words), training, money, and other means of control, new rules (either explicit or implicit).
- Are all agents in the organization subject to the same regime of discipline and control? Resistance might arise from those not subject to the same regime.

Interviews and data collection guide for the episodic circuit of power and obligatory passage points

To identify the circuit of episodic power, the researcher should concentrate on the struggles to establish or maintain control over resources. Once the information system under study has been identified, the researcher should answer questions such as: What are the outcomes people intend by executing actions? Who are performing those actions? Which resources do they need? Which alliances allow control over resources? Who are resisting them?

Issues to focus on:

- Identify power actors (the best way of doing this at the beginning is by asking interviewees who they consider to be powerful)
- How did other agents react? Did they oppose resistance? Describe the resistance presented by other agents.
- How was the resistance outflanked, circumvented or counterpoised?
- Was the result of the resistance successful?

- Ask other agents how they interpreted the objectives of the information systems?
- Identify which groups wanted to exert power over others, who would oppose resistance to keep control over their resources and those who are being disempowered or empowered by the introduction of the information system. Those losing discretionality will resist and those with more discretionality will perceive that they have been empowered.
- It is important also to identify those who will be subjects of control by the introduction of the information system. Those perceiving themselves as the subject of control might resist.
- Did agents succeed in controlling resources and achieving their outcomes? Describe how they achieve this control. How did agents defeat (outflank) resistance?
- Did subordinates have any chance to resist? Did they know how to resist? Did they have resources to offer resistance?
- What other agents came into play because of the introduction of the information system?
- What new alliances were required for the institutionalization of the information system?
- What was the result of the information system? Did those proposing it achieve their intended outcomes?
- Ask managers about their intentions in introducing the information system.
- Ask managers whether they believe that they have achieved their intended outcomes.
- Identify the resources (material and symbolic) required by agents to achieve their desired outcomes.
- Examine how the information system was introduced, particularly the explanations, negotiations or maneuvers that accompanied the adoption and institutionalization of the innovation.
- Were other agents convinced by explanations, or forced by agents owning the information system?
- How were the explanations for the information system and its rationale for adoption presented?
- By drawing on the sociology of translation identify and describe how the information system was institutionalized.
- Into which terms did agents translate the information system?

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