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**Struggles for Meaning and Struggles for Control: The Diffusion of  
Bandwagon Technology in Two Institutional Environments**

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**STRUGGLES FOR MEANING AND STRUGGLES FOR CONTROL:  
THE DIFFUSION OF BANDWAGON TECHNOLOGY  
IN TWO INSTITUTIONAL ENVIRONMENTS<sup>1</sup>**

**ABSTRACT**

Using comparative case studies, this paper shows how institutional contexts influence the process of diffusion of a complex technology by determining the pattern of material resources and authority available to actors in their struggles to control the technology, and by constituting the discursive resources that may be mobilized in their struggles to shape its meaning in preferred ways. The paper also reveals how governance structures may be contested and realigned when they conflict with interests legitimized by dominant institutional logics. This form of contestation and adjustment constitutes one mechanism by which institutional frameworks are tested, stretched and reproduced or redefined.

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How does the nature of the institutional environment influence decisions about the adoption of advanced technology within an institutional field? Reciprocally, how might organizational decisions about technology contribute to the maintenance or adaptation of institutional frames? Although there is a vast literature on the diffusion of technological innovations (Ferlie, Fitzgerald, Wood, & Hawkins, 2005; Greenhalgh, Robert, Bate, Macfarlane, & Kyriakidou, 2005; Rogers, 2003; Ryan and Gross, 1943), and although institutional theory has frequently been mobilized to explain the diffusion of managerial innovations and ideas (Abrahamson, 1991; DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Tolbert and Zucker, 1983), there is surprisingly little work that has examined the specific role that institutionalized structures and meaning systems may play in the process of diffusion of technological artifacts, or on how these decisions might eventually challenge institutional frames.

In this paper, we address these issues by examining the diffusion process for a complex medical technology – positron emission tomography, or the PET scanner – in two institutional contexts, one of which is more market-oriented (Switzerland) and the other more centrally managed by a public agency (Quebec). The comparison allows us to untangle the role of the institutional environment in the diffusion process by holding the object of diffusion constant. The PET scanner is a particularly interesting technology for this study because it is complex, extremely expensive, and was initially at least, quite controversial, creating excitement in the medical community while engaging health care regulators in efforts to control its diffusion.

Indeed, while there has been concern that some health care innovations have been adopted too slowly (Ferlie et al., 2005), there is evidence that others have over-diffused, resulting in excessive health care costs (Foote, 1992). This phenomenon tends to occur for capital intensive technologies (e.g., CT scans, magnetic resonance imaging, PET scanner) that are attractive to health care providers because of their prestige and potential economic and/or clinical benefits.

The resulting so-called “medical arms race” is fuelled by a perception that early acquisition will provide competitive advantage by enhancing the reputation of the provider, as well as by capturing scarce resources such as patients, specialized doctors, and budgets to operate the technology. Moreover, to recoup the acquisition cost of capital intensive technologies, supplier-induced demand may further enhance the overuse of the technology (Foote, 1992; James, Perry, Warner, Chapman, & Zaner, 1991).

And yet health care systems are highly regulated and institutionalized. Regulatory agencies, insurers and professions can intervene in an attempt to influence, control or manage the diffusion of costly innovations (Foote, 1992). More generally, the particular institutional arrangements surrounding the health care systems of different countries or jurisdictions may structure adoption decisions in different ways through their influence on rules, on incentives, and on local values and norms (Alexander and D'Aunno, 2003; Scott, Ruef, Mendel, & Caronna, 2000). While previous economic studies have suggested that more competitive environments tend to speed up diffusion (Rapoport, 1978; Vogt, Bhattacharya, Kupor, Yoshikama, & Nakahara, 1995), there have been few comparative studies that have attempted to trace out in detail the processes of diffusion in different jurisdictions to examine how different contexts influence understandings of the technology and the patterns of adoption and diffusion over time.

Clearly, the PET scanner has all the characteristics of what we call a “bandwagon technology” where the pressure to adopt is likely to be intense. It is thus likely to engage multiple actors within the organizational field, providing an ideal case to address our research questions. The research draws on institutional and socio-political theories of technology diffusion. Specifically, institutional arrangements in each jurisdiction are viewed as structuring patterns of power, interests and values that will influence technology adoption in interaction with the characteristics of the technology itself (Denis, Hébert, Langley, Lozeau, & Trottier, 2002).

We find that the processes of diffusion in both jurisdictions are characterized by struggles between providers and between providers and public authorities as providers push to acquire the technology faster than their rivals. These struggles manifest themselves in two distinct but interacting forms of action. First, they involve what we call struggles for control in which actors strategically mobilize power in the form of material resources and authority to orient adoption decisions according to their particular interests. At the same time, they also involve what we call struggles for meaning in which actors engage in competing arguments or theorizations concerning what the technology is, how and why it should be used and who might legitimately acquire it. We show that the institutional environment influences these processes by determining the patterns of material resources and authority available to actors in their struggles for control, and by constituting the discursive resources or institutional logics on which actors may legitimately draw in their struggles for meaning. We further show how institutional governance structures may be contested and realigned when they conflict with interests that are legitimized by dominant institutional logics. We suggest that this form of contestation and adjustment constitutes one mechanism by which institutional frameworks are tested, stretched and reproduced or redefined.

With its emphasis on contextualized meaning systems, their mobilization for political ends, and their contribution to the work of institutional reproduction (Zilber, 2008), this paper recognizes the importance of values, meaning and culture in institutional processes. At the same time, it illustrates the reciprocal role of institutionalized governance structures in constituting the political context within which meanings are mobilized (Scott, 2008).

We now present the theoretical background for the study, and then describe the case study methodology used. This is followed by a chronological presentation of the two cases, drawing particular attention to the struggles inherent in the diffusion process and to the institutional logics mobilized by actors as they interpret the role of the technology, as well as to

how actors challenge existing institutions. The comparative analysis of the two cases leads to a series of propositions for further research as well as some discussion of the implications of this study for the understanding of institutions.

## **THEORETICAL BACKGROUND**

We now draw together three key conceptual elements that form the backdrop for our analysis. First, we present our view of innovation adoption as a socio-political process embedded in an institutional context. Second, we elaborate on the key components of institutional environments that are likely to shape patterns of diffusion. Third, we focus on the notion of “theorization” as a vector of diffusion, and explain how this concept is applied in this study.

### **Innovation Adoption as a Socio-Political Process Embedded in an Institutional Context**

To simplify somewhat, two diametrically opposing views characterize thinking about the organizational adoption of innovations (Walston, Kimberly, & Burns, 2001). Rational-economic models assume that innovators make rational decisions based on calculations of the risks and benefits of adoption (Rogers, 2003). In contrast, neo-institutional views explain diffusion as the result of coercive, mimetic and normative forces in the institutional environment (DiMaggio and Powell, 1983). From this perspective, by bowing to coercive pressures, imitating other organizations, or by following professional norms, adopters are viewed as seeking legitimacy – possibly even to the detriment of organizational efficiency (Meyer and Rowan, 1977). Various studies have examined the extent to which rational and institutional models of diffusion offer adequate explanations for diffusion, and have suggested that while early adopters are motivated by economic or resource dependence considerations, institutional forces are more influential for later adopters (Tolbert and Zucker, 1983; Walston et al., 2001).

This dichotomous portrait of the innovation diffusion process has however at least two limitations. First, both rational and institutional views tend to assume unitary organizational

actors that share interests and motivations and that are uniformly affected by identical institutional forces. Yet, organizations are composed of various actors having divergent values, interests and power (Cyert and March, 1963), and the interpretation of innovation attributes may differ from one potential adopter to another (Downs and Mohr, 1976; Greenhalgh et al., 2005). In this context, innovation benefits and risks may mean different things to different people whether inside or outside organizations. Moreover, the institutional reference points for different stakeholder groups may be divergent, especially in the pluralistic context of the health sector (Ferlie et al., 2005; Kraatz and Block, 2008b).

This brings us to the second limitation of the dichotomous view – its somewhat artificial separation of rational and institutional forces. As Scott (Scott, 2008: 69) indicates: “*Social action is always grounded in social contexts that specify valued ends and appropriate means; action acquires its very reasonableness from taking these social rules and guidelines for behavior.*” In other words, what counts as rational is itself partly defined and structured by the institutional environment (Friedland and Alford, 1991). For example, the values and interests of physicians – and thus the motivations that drive them – derive partly from the institutional structures in which they work and from the cultural-cognitive assumptions that underpin these structures. In turn, the values and interests that physicians uphold have contributed over time to the very formation of these structures (Scott, 2008; Scott et al., 2000). Thus, in this paper, we view innovation adoption as a socio-political process embedded in and structured by its institutional context. Drawing on Scott (2008), we now describe the components of this context in more detail.

### **Components of the Institutional Context**

According to Scott (2008: 48), organizational environments are constituted of institutions which are “*comprised of regulative, normative and cultural-cognitive elements that,*

*together with associated activities and resources, provide stability and meaning to social life.*" The regulative, normative and cultural-cognitive elements contribute to the three components of institutional environments defined by Scott (2008): governance structures, institutional logics and institutional actors who serve as carriers or agents of institutions.

Governance structures are comprised of regulative and normative elements. They are defined as the "*arrangements by which field-level power and authority are exercised involving, variously, formal and informal systems, public and private auspices, regulative and normative mechanisms*" (Scott et al., 2000: 173). For example, in a pure market economy, regulations provide the market framework within which actors compete for scarce resources, and governmental agencies are expected to correct market failure (Alexander and D'Aunno, 2003) by adjusting rules of the game or by providing appropriate financial incentives. In this context, it is generally assumed that competition is the key mechanism by which innovations will diffuse, and profit maximization is the incentive for firms to adopt them. Conversely, if the administration of organizations in a field is centralized to the state, resources might be allocated according to some centrally determined criterion such as population needs (Streeck and Schmitter, 1985). Thus, regulatory mechanisms such as laws and rules will influence the degree to which coercive pressures may be used to force adoption of innovations (Abrahamson, 1991; Tolbert and Zucker, 1983) or alternately to control or prevent them. Normative elements also contribute to innovation diffusion by propagating ideas about what is morally acceptable and appropriate. For example, in many health care systems, health technology assessment agencies produce studies to inform authorities and providers about the effectiveness and safety of medical interventions (Lehoux, 2006). Professional associations may also promote or hinder change in an institutionalized field (Greenwood, Suddaby, & Hinings, 2002) as well as the diffusion of innovations.

If regulations and normative elements are part of the governance structure, institutional logics shape organizational action (Friedland and Alford, 1991) acknowledging key sources and meanings of power (Friedland and Alford, 1991; Thornton and Ocasio, 1999; 2008) by providing interpretive schemes (Barley, 1986; Ranson, Hinings, & Greenwood, 1980). Institutional logics are defined as “*a set of material practices and symbolic constructions – which constitute [a field’s] organizing principles and which are available to organizations and individuals to elaborate*” (Friedland and Alford, 1991: 248). Institutional logics may thus serve to support and legitimize governance structures.

Scott et al. (2000) identify three institutional logics that emerged sequentially during the transformation of health care in the San Francisco Bay area. First, quality of care is a longstanding institutional logic that is inherent to health care since its origins. This logic is carried by physicians and professional associations who promote technological change in order to provide the best quality services to patients. The emergence of the institutional logic of equity of access to health care coincides with the development of universal coverage systems in most OECD countries (WHO, 2000) and was supported by governmental bureaucracies. However, universal coverage sparked increasing costs that stimulated pressure for enhanced control. Taking the private sector as an archetype of success, market mechanisms based on the 'managed care' concept were introduced in the US, thereby creating a third institutional logic which Scott et al. (2002) relates to efficiency. While the health care industries in different countries have mixed these logics very differently (Tuohy, 1999), the logics of quality, equity and efficiency are inherent in all of them and very much in evidence in the contexts studied (Denis, Lamothe, Langley, & Guerard, 2003) as we shall see.

In Scott et al.’s (2000) study, each of these three logics is presumed to be dominant for some period of time, thereby sculpting the dynamics of the health care organizational field in the United States. While institutional theorists have raised the possibility of multiple logics

(e.g. Friedland and Alford, 1991), with some exceptions (e.g., Lounsbury, 2007; Zilber, 2002), most empirical research has considered them sequentially (Scott et al., 2000; Thornton and Ocasio, 1999) rather than simultaneously. In the present study, we recognize that certain institutional logics may have greater cultural resonance at particular points in time and in particular geographic locations. However, the health care field is complex and inherently pluralistic (Denis, Lamothe, & Langley, 2001; Glouberman and Mintzberg, 2001; Kraatz and Block, 2008a). Thus, we expect multiple logics to coexist and to influence the diffusion of innovations.

Finally, institutional actors are the third component of the institutional environment defined by Scott (2008). Because they create, incarnate and reproduce governance structures and institutional logics, they are fundamental institutional carriers (Scott, 2008). They can also be powerful agents influencing the diffusion and adoption of innovations according to their interests and values. Having established the components of institutions that may influence diffusion, we now address the role of theorization as a potential contributor to the diffusion of innovations.

### **Theorization, Institutional Logics, and the Diffusion of Innovations**

To gain legitimacy, organizations adopt different behaviors ranging from actions such as complying to rules, norms and culturally shared beliefs, to manipulating their environment by the means of discursive strategies (Oliver, 1991; Suchman, 1995). By providing general abstract models and rationalized causality (Strang and Soule, 1998), "theorization" is a discursive strategy that enhances legitimacy as it contributes to the objectification and taken-for-grantedness of an innovation (Tolbert and Zucker, 1996). While local theorization involves ad hoc peer-to-peer interactions to "*make sense of the world*" (Strang and Meyer, 1993: 493), global theorization is believed to accelerate and widen the diffusion of innovation by abstract-

ly homogenizing a potential population of adopters, by specifying the properties and outcomes of an innovation, and by identifying theorists behaving according to the theoretical model as conduits of diffusion (Strang and Meyer, 1993). The more abstract the theorization, the greater its influence. Thus, theorization can be conceptualized as a discursive strategy providing rationales, meanings and interpretations that legitimate and make sense of adopting innovations.

To be effective, theorization has to perform two tasks that are 1) specifying an organizational problem, and 2) justifying a solution (Greenwood et al., 2002; Tolbert and Zucker, 1996). Failing to provide both of these discursive elements would endanger attempts to institutionalize social practices (Greenwood et al., 2002). In addition, the theorization itself has to be perceived as natural, morally appropriate or aligned with interests of strategic actors for an innovation to become legitimate and ultimately be diffused (Tolbert and Zucker, 1996). When applied to the diffusion of technology, theorization has been found to be involved in defining the position of new actors in the organizational field, as well as creating new objects and new concepts (Munir and Phillips, 2005). Yet, while theorization is associated with the legitimation of novelty, to be effective, it also needs to be embedded in or artfully connected to shared cultural understandings (Munir and Phillips, 2005; Strang and Soule, 1998), prevailing discourses (Vaara, Tienari, & Laurila, 2006), or institutional logics (Scott et al., 2000). Hence actors tend to rely on institutional logics to build theorizations. In this study, it is through the study of theorizations generated by organizational actors around the PET scanner technology that we attempt to understand how institutional contexts influence the meanings given to the technology and how these meanings are in turn mobilized within the process of diffusion.

Note that our approach is complementary to but different from analyses that have examined the travel or translation (Czarniawska and Joerges, 1996; Czarniawska and Sevón, 1996) of management ideas across different institutional contexts (Boxenbaum, 2006; Sahlin-

Andersson, 1996). Czarniawska and Sevón (1996) and others have eschewed the word “diffusion” in their studies because it implies a physical metaphor that seems incompatible with the fluid nature of management ideas. Instead, they use the word “translation” to express the notion that these ideas are both reinterpreted and transformed as they are embodied in new contexts. In our study, the technology considered is indeed a physical object. Yet, while retaining its physical integrity, the technology is translated into a new language, or as we describe it here, “theorized” in different ways in different settings. In this paper, we do not focus on patterns of transformation of the technology at adopting sites, but rather on the means and meanings mobilized in decisions to acquire it.

We have now put in place the key a priori conceptual elements needed to develop our understanding of the role of institutional contexts in the diffusion process. Further conceptual developments will emerge following the presentation of the data.

## **RESEARCH CONTEXT AND METHODOLOGY**

### **Research Context**

The PET scanner is a complex imaging technology for diagnosing cancer, cardiac and neurological diseases. Its applications as well as its high acquisition cost (2 million USD / machine) and running cost (1.5 million USD / year) suggested analogies with other technologies that were known to have been subject to bandwagon pressures. Experts agree that about one PET scanner for each million of population is sufficient for clinical and research purposes (Cleemput, Camberlin, Van den Bruel, & Ramaekers, 2008).

In order to show how different institutional environments may differentially impact patterns of diffusion of this technology, the study compares jurisdictions with contrasting modes of governance: the publicly funded Quebec health care system and the more market-oriented Swiss health care system. Both jurisdictions have similar populations (around 7.5

million<sup>2</sup>) and are sufficiently small to enable an in-depth study including virtually all individual adoption decisions of the PET scanner up to 2006.

The Quebec health care system is publicly run and highly centralized. The Ministry of Health funds the system from tax revenues and negotiates global budgets with hospitals, pays doctors (largely on a fee-for-service basis according to a fixed schedule) and covers the cost of other health care professionals within recognized health care institutions. The health care system is also highly regulated. For expensive technologies such as the PET scanner, the Ministry of Health must authorize hospitals to acquire the technology and in principle, it supplies the operating and acquisition budgets, although hospitals may have access to some capital funding from private foundations. There is currently no co-payment for patients for medically necessary services, and a Health Technology Assessment Agency makes recommendations concerning which technologies should be reimbursed by the state.

In contrast, the Swiss health care system is more decentralized and market oriented, although unlike the US, all Swiss citizens are covered for basic health care. The system has two main levels of decision making. The Internal Federal Department (IFD) is the highest political body in this country. Switzerland is divided into 23 cantons that are sovereign with respect to the health care organization in their territory, and with respect to the financing of expensive medical technologies. Thus, each canton has its own agenda as to which technologies should be adopted. Switzerland has no formal health technology assessment agency. In this health care system, it is a federal competence to authorize the reimbursement of medical interventions and technologies, while in most of the cantons, public hospitals require the authorization of the cantonal government before acquiring a PET scanner, and they are reimbursed by health insurance.

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<sup>2</sup> The population of Quebec was estimated to be 7,546,131 in the 2006 Canadian census (Statistics Canada, 2007). The population of Switzerland was estimated at 7,508,739 in 2006 (Office fédéral de la statistique, 2007).

Unlike the Quebec health care system where there is a single payer covering all essential medical interventions, Switzerland had 87 different insurance companies offering basic health plans in 2006. Switzerland also has parallel public and private hospitals. In both jurisdictions, PET scanner procedures were universally covered although at different times: for Switzerland in 1993, and in 1998 for Quebec. In addition to premiums and taxes, patients have to pay a deductible ranging from 300 CHF to 2500 CHF and to pay a 10% out-of-pocket fee after the deductible is attained. Moreover, while a unified tariff is applied throughout Quebec, this was not the case in Switzerland before January 2004 when providers had to negotiate locally with the Cantonal Health Association the tariff to be reimbursed for each medical intervention. With the introduction of a unified tariff (called TARMED) in 2004, private clinics were certain to obtain the same tariff as public organizations. Table 1 summarizes the main differences between the governance structures of the two health care systems.

**TABLE 1:  
GOVERNANCE STRUCTURES OF THE QUEBEC AND SWISS HEALTH CARE  
SYSTEMS**

<b>Dimensions</b>	<b>Québec</b>	<b>Switzerland</b>
Economy	More centrally planned	More market oriented
Centralization	Centralized	Decentralized
Funding sources	One	Many
Authorization to buy expensive technology	From the central government	From the cantonal governments
Financing the operation of expensive technologies	Operational budget from the central government	Authorization to reimburse from the federal government
Physician payments	Fee-for-service (capped)	Hospitals: Salaried Private: fee-for-service
Ambulatory Hospital Payment	Global Budget	Fee-for-service
Technology Assessment Agency	One	None
Health insurance companies	One	Many
Types of hospitals	Public	Public and private

### **Research Design and Data Collection**

The research involved a comparative and retrospective case study design with embedded units of analysis (Yin, 2003). The two jurisdictions constitute extreme cases in terms of

governance structures while having sufficient similarities in terms of population size to allow useful comparisons (Eisenhardt, 1989). To understand the key features of the two institutional contexts, documentary data about each health care system were collected and reviewed.

Data on the adoption and diffusion process itself were collected from two sources. First, 84 semi-structured interviews were carried out at all levels of analysis in each jurisdiction: national (federal), regional (cantonal) and at each adoption site. In Quebec, 41 interviews were conducted of which 32 lasted between 40 to 110 minutes, and 9 between 20 to 40 minutes; in Switzerland, 43 interviews were performed of which 35 lasted 40 to 110 minutes, and 8 between 20 to 40 minutes. Respondents were asked to explain what the technology meant to them and to describe the decision processes in which they were involved. Internal and external documents were also collected and analyzed to establish process chronologies, to examine written theorizations of the technology, and for triangulation purposes (Eisenhardt, 1989; Patton, 2002).

## **Data Analysis**

To compare the diffusion patterns, a detailed narrative was first constructed for each case iterating between episodes of data collection and analysis (Eisenhardt, 1989; Miles and Huberman, 1994). Each individual adoption or attempt at adoption in both Quebec and Switzerland was documented and analyzed in terms of three categories: the rationales used by adopters, their actions and their results. Visual mapping strategies as well as matrix displays (Miles and Huberman, 1994) were used to synthesize the data (Langley, 1999) and to compare the evolution of the processes across the two jurisdictions.

Data analysis led us to identify struggles between actors in the organizational field along two axes: vertical and horizontal. On the one hand, “vertical struggles” refer to confrontations between the regulator (Ministry of Health in Quebec, various agencies in Switzerland)

and other institutional actors. We use the term “horizontal struggle” to refer to the competition among institutional actors for scarce resources. As we shall see in the analysis, although the Quebec health care system is not theoretically a competitive market, competition among health care providers nevertheless permeated the diffusion process. We also came to qualify these struggles in terms of two inter-related modes of action: struggles for meaning, in which participants drew explicitly on different theorizations to justify their positions and to interpret the technology in terms that were favorable to them; and struggles for control in which organizational actors mobilized authority and material resources to achieve their goals. We operationalized the notion of theorization (Strang and Meyer, 1993; Strang and Soule, 1998; Tolbert and Zucker, 1996) to include statements dealing with four questions: *what* was the purpose of the technology, *why* the technology should be adopted, *who* should adopt it, and *how* it should be diffused.

We now present narratives of the diffusion processes in Switzerland and Quebec, emphasizing how struggles for meaning and struggles for control punctuated the processes and influenced their outcomes.

### **THE DIFFUSION OF THE PET SCANNER IN QUEBEC AND SWITZERLAND**

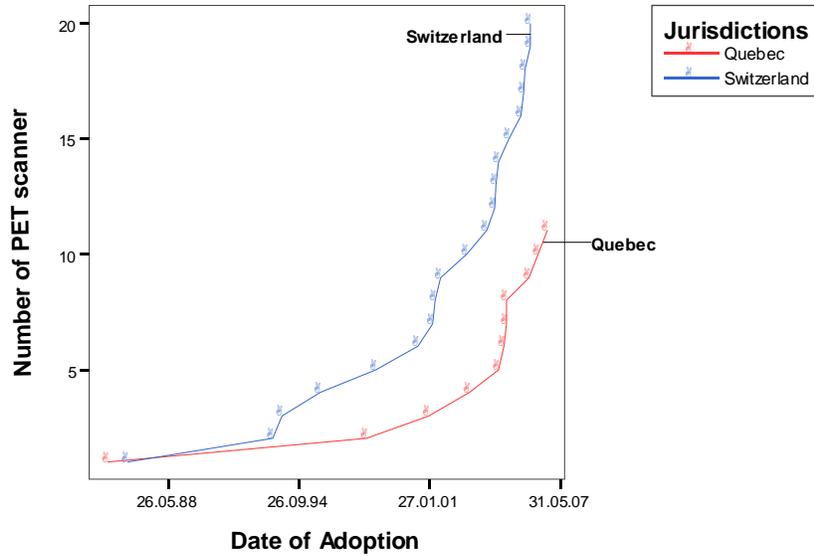
Prior to detailing the key events in each diffusion narrative, it is important to note certain commonalities. First, in both jurisdictions, it is clear that the PET scanner took on the qualities of a “bandwagon” technology. The governance structures in both institutional contexts afforded incentives for doctors and hospitals to adopt the technology as quickly as possible – and preferably in advance of rivals – in order to provide the best care for patients, consolidate their prestige, maintain their position with respect to others providers, attract patients and doctors, enhance revenues and remain viable sites for clinical research. This urge to adopt lies at the root of the horizontal struggles mentioned above and is illustrated by the following quotations from interviews in the two jurisdictions:

**TABLE 2:  
THE PET SCANNER AS A BANDWAGON TECHNOLOGY**

	<b>Quebec</b>	<b>Switzerland</b>
Best care Beating the competition	<i>If we want to give the best cancer care, we have to have this equipment. There's competition between the general hospital and the teaching hospital to determine who will dominate cancer programs in the region.</i>	<i>Losing this technology would mean weakening our cancer institute in relation to the competition and we can't allow that if we want to remain leaders in this sector.</i>
Benefits to doctors	<i>We learn things and we have the impression that we are giving better services to clients. And its an activity that generally brings in revenues...</i>	<i>This way, Nuclear Medicine doctors gained an addition 150'000 CHF a year per doctor."</i>
Maintaining research viability	<i>At X university, they are excluded from over 30 multi-centre clinical protocols [for lack of a PET scanner]. They become regional, they can't have an impact.</i>	<i>To position ourselves in research. [They] don't award pharmaceuticals projects if the institute does not have a PET scanner.</i>
Prestige, attractiveness	<i>Pride in having something that others don't have. The pride or desire to be bigger... always bigger.</i>	<i>The CEO of the teaching hospital needed a new boss for the nuclear medicine department, and he had to offer a PET scanner [to make the hospital attractive].</i>

At the same time, regulatory bodies in both institutional contexts attempted to control the diffusion of the technology (with greater or lesser success), driven by concerns about effectiveness, efficiency and economy. This is what gave rise to the vertical struggles. Nevertheless, as shown in Table 1, the mix of governance mechanisms is clearly more market-driven in Switzerland. The overall result in terms of the diffusion process was, as might have been expected and as shown in Figure 1, much faster and deeper diffusion in Switzerland than in Quebec. These data are interesting and revealing in themselves. However, they do not tell us anything about the actual processes by which diffusion took place, and in particular how the tensions we have just described played themselves out. A key purpose of this paper is to open up this black box. We now describe the diffusion processes in each jurisdiction. Rather than presenting an exhaustive portrait of each process, we emphasize a sample of four episodes in Quebec and four episodes in Switzerland that are particularly revealing of the dynamics at play.

**FIGURE 1:  
DIFFUSION OF THE PET SCANNER IN QUEBEC AND SWITZERLAND**



### **Diffusion of the PET Scanner in Quebec**

After the early acquisition of a PET scanner in Region A for research purposes, teaching hospital THB located in a town of about 150,000 people somewhat distant from the main centres of population in Quebec, acquired a PET scanner through the entrepreneurship of a local nuclear doctor. The first use of the PET scanner in a clinical setting in this relatively small and remote area was funded through the hospital budget. It aroused consternation among nuclear doctors in teaching hospitals around the province, and was deemed irrational given the small population of the region. This prompted those hospitals to pressure for a PET scanner for themselves. In addition, the decision of the Centers for Medicare and Medicaid Services in USA to authorize the reimbursement of the PET scanner for lung cancer as well as the wide and fast diffusion of this technology in USA contributed to build up pressure on the Ministry of Health to more widely diffuse the technology. We now describe and analyse four episodes in the diffusion process of the PET scanner in this organizational field.

*Episode Q1: Horizontal struggles for meaning in Region C.*

While the acquisition of the PET scanner by hospital THB encountered no competition either locally or provincially, the competition to acquire a scanner between the general hospital GHC, a specialized hospital in cardiology and in lung cancer, and the teaching hospital THC, the most important teaching hospital in the area impeded attempts at adoption in Region C. In their struggles to convince the Ministry of Health to acquire a PET scanner for clinical as well as for research purposes, both hospitals submitted reports to the Regional Health Board in 1997 and 1998, and later in new updated versions in 2001. These reports drew on competing theorizations of the PET scanner technology, illustrating what we have called struggles for meaning. In this case, as shown in Table 3, both hospitals mobilized an institutional logic related to the quality of care – one of the logics suggested by Scott et al. (2000) as underlying health care systems. However, the meanings they attempted to impose on the technology were different.

Specifically, because of its dual mission in cardiology and in lung cancer, hospital GHC declared itself to be the best centre to receive a PET scanner. Hospital GHC contended that its supra-regional mission combined with it being the hospital performing the highest number of cardiac surgical operations justified obtaining a scanner. Since the evidence on the potential in the case of lung cancer was indisputable, hospital GHC also highlighted the fact they were performing the highest number of surgeries in pulmonary cancer. In contrast, teaching hospital THC argued that oncology was the main application of the scanner. Given that more than half of the clinical activities in oncology in region C were performed at the teaching hospital THC, it argued that it should be the first centre to adopt a machine. Also, since the cyclotron was an essential ingredient to produce radiopharmaceuticals, its location also became an issue. Because the half-life of the radiopharmaceutical used in cardiology is approximately 2 minutes, hospital GHC argued that the cyclotron should be close to their build-

ing. Emphasizing its mission in research and in evaluating new technology, teaching hospital THC argued that the cyclotron should be in their organization.

**TABLE 3:  
COMPETING QUALITY-BASED THEORIZATIONS IN REGION C**

<b>THEORIZATION COMPONENTS</b>	<b>Hospital THC: PET for oncology</b>	<b>Hospital GHC: PET for cardiology</b>
<p><b>What to adopt? Definition of the innovation</b></p> <p>Oncology vs. Cardiology</p>	<ul style="list-style-type: none"> <li>• <b>PET as a research tool</b></li> <li>• <b>PET as a clinical tool for oncology</b></li> </ul> <p>Argument supported by one article containing a systematic review of evidence supporting PET for oncology.</p> <p><i>"Clinical indications for the PET technology are by order of importance, oncology (over 18 pathologies for which indications are recognized), neurology (2 indications), and cardiology (1 indication)."</i></p>	<ul style="list-style-type: none"> <li>• <b>PET as a clinical tool for cardiology and pulmonary oncology</b></li> </ul> <p>Argument supported by reference to 51 studies, 42 of which provide evidence for cardiac applications.</p> <p><i>"The two areas where clinical use and potential are best developed and recognized are precisely for heart disease and lung cancer."</i></p>
<p><b>Why adopt?</b></p> <p><b>Quality-based</b> logics but different definitions of the innovation</p>	<ul style="list-style-type: none"> <li>• <b>PET has several clinical advantages</b></li> </ul> <p><i>Early diagnosis of cancer</i> <i>Early evaluation of the effectiveness of anticancer therapeutic interventions</i></p>	<ul style="list-style-type: none"> <li>• <b>PET scanner is effective</b></li> </ul> <p><i>"Several studies confirmed the high diagnostic performance of the PET scanner for the detection of heart disease."</i></p>
<p><b>Who should adopt and how?</b></p> <p>Common <b>quality-based</b> arguments based on different definitions of the innovation</p> <p>Asymmetric <b>quality-based</b> arguments based on competence</p> <p>Asymmetric <b>efficiency-based</b> arguments</p>	<ul style="list-style-type: none"> <li>• <b>Those whose missions and activities are aligned with the technology</b></li> </ul> <p><i>"The strong points of the hospital were that it was a large hospital treating more than half of the clinical activity in oncology in the region."</i></p> <ul style="list-style-type: none"> <li>• <b>Those with appropriate competence</b></li> </ul> <p><i>"At THC, there was already a physician team. We had hired two nuclear doctors who were trained or in training with fellowships of a least a year."</i></p>	<ul style="list-style-type: none"> <li>• <b>Those whose missions and activities are aligned with the technology</b></li> </ul> <p><i>"GHC is a designated university institute in cardiology and pneumology where the highest number of heart surgeries are undertaken each year. It is also the centre with the highest number of lung cancer surgeries"</i></p> <ul style="list-style-type: none"> <li>• <b>Those who need the cyclotron close to their installation</b></li> </ul> <p><i>"Our argument at GHC was that we needed the cyclotron in cardiology given the short half-lives of radiopharmaceuticals in this speciality"</i></p>

Somewhat paradoxically, these self-interested arguments and destructive battles did not contribute to helping accelerate the diffusion of the technology given that the government wanted to limit diffusion to one machine: "Faced with these battles, what do the government administrators do? They don't make a decision. They don't really know." In other words, competition expressed via struggles over meaning – the only legitimate means of acquiring

the technology in the Quebec health care system, placed governmental bodies in a quandary and initially at least did not move adoption forward.

***Episode Q2: Consolidating meaning: The Health Technology Assessment Agency Report.***

Quarrels in region C, the first clinical use of the technology in Quebec, the authorization to reimburse the PET scanner procedure by the Centers for Medicare and Medicaid Services in USA, and the emerging evidence in the scientific literature praising the clinical benefits of the PET scanner stimulated the president of the Quebec Medical Association to ask the Ministry of Health to produce a report on the cost-effectiveness of this technology.

The clinical conclusions of the Health Technology Assessment Agency report published in October 2001 were unequivocal. The need for more PET scanners was undeniable, and at least 15,000 exams were said to be required annually. Although the report does not proclaim any application (cardiology, oncology, neurology) as being dominant, it definitively supports its legitimacy. The following quotations from interviews support our contention that from then on the technology was perceived as legitimate from a clinical point of view. The technology is described as an essential medical tool based on a quality of care institutional logic.

"It's like asking whether you need an operating room in a hospital. (...) It's an indispensable and necessary tool." (Nuclear doctor)

*"It's inevitable; it's a question of the quality of medicine. Some will even say that it is bad medical practice not to use it in diagnosis."* (Medical Association Official)

*"After the Health Technology Assessment Agency report, the first and most visible impact is that we rapidly received many demands from the hospitals that were all referring to this report."* (Biomedical engineer)

***Episode Q3: Struggles for meanings grounded in access and quality institutional logics.***

Yet while the report clarified the quality-based legitimacy of the PET scanner, it paved the way for further struggles over the meaning of the technology that drew on different institutional logics. Indeed, the recommendations of the report suggesting that the PET scanner technology should be *"progressively deployed in collaboration with teaching hospitals and university institutes"* and *"through research activities"* raised several concerns among nuclear doctors. The recommendations were perceived by the Quebec Medical Association as a signal that the PET scanner technology was going to be diffused to teaching hospitals only given their research mission. This was perceived by the Medical Association as a way of favoring research at the expense of clinical applications. To counter these recommendations, the Medical Association created a special committee rallying nuclear doctors in remote hospitals, and began to directly negotiate with the Government in power.

By primarily defining the PET scanner as a clinical device and not a research tool, the aim of this special committee was to counter the recommendations favoring teaching hospitals, and to democratize access to this high-end medical technology by proposing that 12 major centres in oncology should obtain a PET scanner, but at once and not progressively. The debate over how the technology should be diffused intensified with the availability of the PET-CT scanner, a new machine that combined two existing technologies. Because the CT scanner provides quasi instantaneous anatomical images, the combination of both technologies increased the precision of the diagnosis.

The parallel development of the PET-CT turned the struggle into a confrontation between two clans: the Pro-Stand-alone-PET clan which favored the diffusion of 12 PET scanners against the Pro-PET-CT coalition which wanted to diffuse the technology progressively from teaching hospitals to regional hospitals. Because the cost of a PET-CT (\$3.7 millions US) was twice the price of Stand-alone PET, promoting the diffusion of the former was

equivalent to encouraging narrower diffusion given that only \$23 millions US were available in the provincial budget, and that infrastructure building cost had to be taken into account. The advent of the PET-CT was not good news for the pro-Stand-alone-PET coalition.

Table 4 illustrates the struggle for meaning that ensued. Competing theorizations of the technology were put forward by representatives of the Medical Association and by the teaching hospitals. As can be seen, these theorizations draw respectively on institutional logics of equity of access in the first case and quality in the second case: the parallel metaphors used by some of our interviewees to justify who should be allowed to have the technology in Table 4 are both picturesque and revealing.

**TABLE 4:  
Competing Theorizations Following the Health Technology Assessment Report**

THEORIZATION COMPONENTS	Stand-alone PET Access-based logic	PET-CT Quality-based logic
<b>What to adopt? Definition of the innovation</b>	<ul style="list-style-type: none"> <li>• <b>PET as a proven clinical tool needed by all regardless of location</b></li> </ul>	<ul style="list-style-type: none"> <li>• <b>PET-CT as a high-performing proven clinical and research tool</b></li> </ul>
<p><b>Why adopt?</b> Legitimacy grounded in equity of <b>access-based</b> arguments vs. <b>quality-based</b> arguments</p> <p>Competing interpretations of <b>efficiency-based</b> logic tied to access-based and quality-based arguments respectively</p> <p>Asymmetric naturalization arguments</p>	<ul style="list-style-type: none"> <li>• <b>PET scan for all</b> <i>"Chemotherapy is hard as a treatment. That's why with the PET scanner, we can evaluate whether local radiotherapy or chemotherapy would be better and protect the child from suffering. [...] Just think if you have a 12 year-old child who needs radiotherapy and you have to send them to the big city. It's torture."</i></li> <li>• <b>Low purchase costs and lower travel costs with greater equity and access</b> <i>"Oncology is permanent. You have your cancer, you come back, you are re-evaluated. There's a lot of travelling. So the PET will allow the regionalization of care, keeping resources, people, and avoiding excessive travel costs."</i></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Better quality diagnoses</b> <i>"A PET scanner will locate the tumor... in the body but not in a specific way. It will say: it is there. But with the CT, we can take a tomographic image which will locate the tumor in the tissue so we can see exactly where it is."</i></li> <li>• <b>Lower cost per examination with higher quality</b> <i>"An ordinary PET scanner can do about six or seven patients per day. With the PET-CT, we can go up to 12 so we can double the volume. "</i></li> <li>• <b>Inevitability of PET-CT</b> <i>"[In the conference] basically nobody was speaking of Stand-alone PET. Nobody. [...] I can't think of a single institution that has actively gone to tender for Stand-alone PET."</i></li> </ul>
<p><b>Who should adopt and how?</b></p> <p>Distribution based on equity (access-based logic) vs. competence (quality-based logic).</p>	<ul style="list-style-type: none"> <li>• <b>PET for all, coherence with prior distribution of oncology centres</b> <i>"Better give everyone a good Chrysler than giving a Ferrari to 3 or 4 people, that's what we wanted at the Association."</i> <i>"With the government, we proposed that the 15,000 exams that were necessary per year in oncology, that the 12 first pieces of equipment be installed in the regional centres for</i></li> </ul>	<ul style="list-style-type: none"> <li>• <b>Competence has to be developed first before allowing adoption</b> <i>« They'll say, « I am a Cessna pilot, I can also pilot a 747. " People will say that, but it makes no sense! (...) They'll say: "It's not complicated – I'll put it on automatic pilot." OK, but is that the function of a 747 pilot? So you'll place your life in the hands of someone who doesn't have the expertise necessary to make complex and major</i></li> </ul>

Again, these struggles for meaning were not helpful in enabling the government to make decisions as to how the technology should be disseminated. The opposing theorizations draw on institutional logics that both have strong cultural-cognitive resonance in the context of the Quebec health care system. However, they lead to completely opposite conclusions. Discursive struggles alone were insufficient to resolve this issue

***Episode Q4: Beyond struggles for meaning: Pre-emptive adoptions in Region A.*** The competition between the two factions placed the government in an uncomfortable position since opting for one or other solution was politically very difficult. This tended to reaffirm the status quo despite repeated applications from hospitals to obtain a PET scanner, and disillusionment and cynicism from many nuclear doctors:

*"The deployment of PET scanners, I've been hearing about that for four years, and another announcement arrives every 15<sup>th</sup> of the month. It's the classic running gag. I've stopped believing in that."*

Eventually, unanswered applications to the government for a PET scanner prompted teaching hospital THA1 to acquire a machine without the consent of the Ministry of Health. To bypass the regulations, THA1 convinced its private foundation to buy and rent the PET scanner to the hospital for a symbolic sum. By January 2003, the scanner was functional. To justify this maneuver, THA1 suggested to the authorities that they consider the machine as a research tool although everyone knew that it was more than this. Because hospital THA1 was in a position to publicly justify the need for a PET scanner in oncology, it seemed unlikely that the government would denounce it. Given that access to health care is a public service in Quebec, people could not at that time pay privately for health services that were insured by universal coverage. Despite this rule, THA1 had to find a way to finance the running costs of its scanner. The solution was to offer the PET scanner at nights and on weekends on a private basis to private clinics or patients willing to pay to jump the waiting list. This provoked a

swift reaction from the Minister of Health who asked THA1 to stop selling public services to the private sector. In exchange, the government would provide them with an operational budget. Teaching hospital THA1 immediately complied, having successfully won its point.

This delinquent behavior was taken up by other hospitals that also launched the process for adopting a PET-CT even though they had not yet received the formal consent from the government. For those hospitals with access to financial resources, this was actually a good strategy to obtain a PET scanner before others.

*Summarizing the Quebec case.* The Quebec case study shows how bandwagon pressures for adoption of an advanced technology played themselves out in a public health care system in which the government, as single payer is committed to limiting the diffusion of the PET scanner by taking a strict cost-containment approach, a position that appears justifiable given that the government covers almost all health care expenditures in this institutional field. Competition about who should adopt manifests itself in struggles for meaning where different would-be adopters develop theorizations of the technology (what it is, why it should be adopted, who and how it should be adopted) grounded in the institutional logics underlying the health system but oriented towards their interests. However, faced with competing and incompatible but equally legitimate logics, government bodies find themselves in a difficult position in arbitrating between these claims. At this point, the struggles moved to a different level.

In fact, the legitimacy of the technology derived from wide diffusion outside this organizational field and the endorsement of the PET scanner by the Health Technology Assessment Agency report as an essential tool in diagnosing life threatening conditions (cancer) opened the door for organizations with sufficient political clout and financial resources to adopt the technology preemptively without government consent. The established legitimacy of the technology as an essential clinical tool based on the quality and access logics embedded

in the institutional context minimized the risk incurred by delinquents in bypassing government rules:

*“Put yourself in the shoes of the Minister who comes to tell us: “Whoah! You are going to get the machine out of there and you are not going to use it.” That’s a risky business. If that went to the media, we would have several very sensible and logical explanations to give to the people. The government would look pretty silly. (...) Especially as there are so many cancer cases... [the government wouldn’t want to hear us] tell patients, “Well – we’re ready to offer you a useful service, but the Minister has decided that you can’t have it” Politically, you have to be careful.”*

To avoid losing face and to avoid endorsing the supply of services by the private sector, the government quickly came up with a dissemination plan that gave the powerful health care providers what they wanted, favoring in the process teaching hospitals and the general hospital GHA in the main urban centers with access to financial resources, and implicitly recognizing and legitimating their theorizations.

### **Diffusion of the PET scanner in Switzerland**

As in Quebec, early adoptions of PET scanners in Switzerland were devoted to developing the technology for research purposes. However, it was the unexpected donation from a patient to the teaching hospital THU in canton U that literally opened up the technology for clinical use. At this point, the key issue was the question of obtaining reimbursement for PET scanner procedures. This manifested itself in vertical struggles between the Federal government and the health care providers. We present four episodes in the diffusion of the PET scanner in Switzerland, the first two oriented around the key issue of reimbursement and the other three oriented around local competitive issues in specific cantons.

*Episode S1: Early struggles for meaning at federal level.* Under the initiative of teaching hospital THU, the drive to obtain reimbursement for PET procedures was organized through a national consensus conference and involved among others two teaching hospitals and an official of the Federal Department of Health. While the federal government official

was requesting evidence on patient management, nuclear doctors were presenting evidence related to the high quality of functional images produced by the PET scanner. By so doing, each group was mobilizing a different dimension of a quality-based institutional logic by defining the effectiveness of the technology differently.

The high quality of images finally convinced the federal government official to allow reimbursement of some PET scanner procedures in cardiology and neurology because the population might benefit from this technology. However, since Swiss law requires that to be included in the compulsory reimbursement list, new procedures must be proven to be effective, appropriate and cost-efficient the Federal Department of Health could not authorize this reimbursement since the PET scanner did not fulfill any of these criteria at the time. To permit the reimbursement of the PET scanner, the Federal Department of Health wrote an ordinance which amended the Law and which stated that promising new technologies could be reimbursed as long as health care providers were nominated by the government and provided they agreed to evaluate new technologies in order to build evidence on the impact of the technology in terms of patient management. Nominating centers and forcing evaluation was a good cost-containment strategy and a tactic to accumulate evidence on patient management. Only two centers were nominated for reimbursement at this point: teaching hospitals THU in Canton U and teaching hospital THV in canton V. Because PET providers had to invest in the evaluation of the technology, a fairly generous reimbursement rate was authorized, attracting interest in the technology from other potential providers. Reimbursement of two indications in oncology (cancer) was added in 1997 under similar conditions.

Up to this point, quality and efficiency-based logics ostensibly dominated the scene. However, the nomination of the two teaching hospitals as sole legitimate providers would soon be contested, as other providers attempted to move into this terrain. Note that while presence on the Federal reimbursement list was necessary for procedures to be reimbursed on

a compulsory basis, providers could also try to negotiate directly with their cantonal insurance associations. This situation led to a new struggle around the meaning of the technology in canton S.

*Episode S2: Struggles for meaning grounded in market and efficiency based logics.*

The new reimbursement in oncology paved the way for the extensive use of this technology, and engendered a struggle between the teaching hospital THS and the private hospital PHS to obtain the authorization of the cantonal government to acquire a PET scanner. However, the cantonal authorities estimated that two PET scanners were too many for this relatively small cantonal population (around 450,000 people) and feared this would contribute to increasing health care costs. While these two hospitals were struggling, the unexpected acquisition of a PET scanner in 1998 by private clinic PCS in the same canton, and maybe more importantly its application to be added to the reimbursement list surprised the federal government. However, uncertainty related to the clinical effectiveness of the technology, which was still under evaluation, and the fear of seeing widespread and chaotic diffusion of PET scanners made the Federal Government reluctant to open up the list to other providers, and especially to private providers who might be more interested in making a profit than in evaluating the technology.

*"...because we had a new law for introducing new technologies more quickly, and Mister X just wanted to make a profit. He wanted to make money with that. It upset all our system for introducing new technology."*

Since the federal government did not respond to the request of the private clinic PCS, a law firm was hired to bring a lawsuit against the Federal Department of Health before the Federal Tribunal of Insurance. The law firm argued that the ordinance was too restrictive and was contrary to the free practice of medicine in a free market. Given that the Swiss Constitution asserts that the State can restrain free market competition if it is in the public interest, the Federal Department of Health argued that nominating two centers was a good way to limit

cost while providing access to the population to advanced technologies. Table 5 synthesizes the resulting theorizations of the technology used by both parties.

**TABLE 5:  
Competing Theorizations Surrounding Reimbursement in Switzerland**

Theorization components	Quality and efficiency-based logics	Free Market-based Logic
<b>What to adopt</b> Definition of the innovation	<b>Government/ Two main centres</b> PET scanner in oncology, but also in cardiology and neurology	<b>Private Clinic and other providers</b> PET scanner in oncology, but also in cardiology and neurology
<b>Why adopt or not?</b>  Legitimation essentially tied to <b>efficiency and quality-based</b> arguments in the first case vs. pure <b>free-market-based</b> arguments in the second	The PET scanner is still being evaluated. It may be a valuable technology, but this is uncertain and adoption should be controlled for cost-containment reasons.  <i>We attempted to defend a system of open social insurance with complete modern services for all citizens but at a reasonable financial cost.</i>	Because the PET scanner should be available to all health care providers, to freely practice medicine as they see fit.  <i>[The firm] mobilized liberal economic argument, about open markets, the right to exercise the medical profession as freely and as completely as possible, even invoking the European convention on human rights.</i>
<b>Who should adopt (be reimbursed), and how?</b>  Legitimation grounded in <b>quality and efficiency-based</b> arguments vs. <b>free market-based</b> arguments	Two nominated centres only because they have the expertise to evaluate the technology  <i>The two centres were the initiators. We wanted to limit it to the two centres to allow the evaluation of the technology.</i>	All organizations wishing to offer PET scanner procedures.  <i>Normally, everyone[providers] should be able to use this technology</i>

Due to the non-response from the Federal Department of Health, the Federal Tribunal of Insurance rejected the lawsuit because “no decision was made” in this case. Although the lawsuit did not give the private clinic PCS a victory, it made the Federal Department of Health react quickly. Indeed, based on this lawsuit, the head of the department calculated that the position of the government would be difficult to defend before the Swiss Anti-trust Commission. Because many centres were by then sending letters to the Federal government to be added to the reimbursement list, the head of the Federal Department of Health considered re-evaluating the concept of having a positive list of two PET centres.

*There were fears that centres that had not been included in the list could appeal to the anti-trust commission and therefore question the legitimacy of federal authorities to designate [PET scanner] centres. (...) We would have had some trouble defending the list.*

Thus, in August 1999, the Federal Commission for Health Insurance created a PET Study Group to develop a new way to nominate PET centres. By June 2000, this study group proposed nominating centres on the basis of quality criteria, such as having a machine with minimal technical requirements, hiring a nuclear doctor to interpret clinical results and maintaining a registry of PET scanner activities. Quality criteria were chosen because they are perceived as being legitimate by Government officials, and were to be in force by January 2001. Meanwhile, with the unexpected acquisition of the PET scanner by the private clinic PCS in canton S, the cantonal government S granted authorization for a PET scanner to the teaching hospital THS and the private hospital PHS if they agree to share one machine for the two hospitals. By July 2000, both hospitals agreed to buy one PET scanner. This episode interestingly reveals the power of the market-based logic in Switzerland as compared with Quebec. Although the market-based theorization failed to give the private clinic what it wanted, its lawsuit and the threat of further market-based contests forced the government to reconsider its criteria for reimbursement, essentially opening up the diffusion of the technology to all-comers with a basic set of credentials. Nevertheless, decisions about acquisitions within the cantons depended on the specific rules for approval established by cantonal governments. We now look at two interesting episodes occurring in other cantons that again reveal the dynamics of this institutional context.

***Episode S3: Bypassing vertical control through horizontal collaboration in Canton N.*** With the intention of remaining competitive at the national level, teaching hospital THN in canton N ordered a business plan to evaluate the profitability of opening a nuclear medicine unit and a PET scanner. As the conclusion of the report was positive, the hospital tried to persuade the cantonal authority to approve a PET scanner in order to attract a good head of department. However, the cantonal government refused the application, invoking the already high number of PET scanners in Switzerland.

*"The official line was that five PET scanners in Switzerland are enough, so they [the politicians of the Canton N] didn't want to have a PET scanner in the Canton N."*

In the face of a categorical “no”, teaching hospital THN and private hospital PHN, instead of competing for patients, agreed to build together a private company with the dedicated mission of offering PET scanner procedures. Given the size of the population (about 950,000 people) this arrangement was profitable for both parties and given that this was a private company, the approval of the canton was not required. The private company acquired a PET scanner in August 2001.

***Episode S4: Vertical and horizontal struggles in Canton D.*** Being interested for years in owning a PET scanner, the PET working group at teaching hospital THD attempted to convince the cantonal government to authorize such an acquisition. A financial-economic study was performed and favored an auto-financed PET Unit. This implied that Teaching Hospital THD would loan money to the PET Unit and in exchange would reimburse the hospital with the profit generated. However, the Cantonal Government resisted. Having heard of the imminent adoption of a SPECT scanner by private clinic PCD2 in the canton, the cantonal government preferred to carefully study whether a PET scanner would perform the same type of diagnoses as the SPECT scanner. Because there is a norm, at least in this canton, that the public sector should not provide what is supplied by the private sector, the cantonal government was disinclined to let the public hospital acquire a PET scanner.

*The official didn't believe in new technologies and he was sensitive to requests from the private sector. That's how it is in Switzerland. When the private sector takes charge, we believe that the public sector shouldn't be involved.*

Once the cantonal government knew the SPECT scanner was not as powerful as the PET scanner, it finally provided its consent nearly one year after the financial-economic study was written, and the machine was adopted in November 2002. This episode again illustrates the key role of the market-based logic in the context of the Swiss health care system, where

public officials come to the defense of private interests against public ones – something that would not have been seen as legitimate in Quebec.

*Summarizing the Swiss case.* The Swiss case shows how initially tight controls on the diffusion of technology grounded in quality and efficiency logics rapidly gave way to the dominance of market-based logics of diffusion as the legitimacy of initial reimbursement rules (that gave a virtual monopoly to two providers) were called into question.

In terms of vertical struggles, cantonal governments sometimes attempted to use quality and efficiency criteria to hold back diffusion. However the decentralized nature of the governance structures allowed private providers to enter the market and enabled public providers to bypass constraints through a variety of strategic behaviors including collaboration with the private sector (as in episode S3). Moreover, even public providers began to emphasize efficiency and market-based theorizations in their proposals because the main preoccupation of cantonal authorities was that the technology would pay for itself.

While hospitals competed aggressively to get access to the PET scanner and the resources they could potentially derive from it, other hospitals already controlling the technology strove to increase entry barriers, lobbying authorities to prevent further adoptions. To sum up the process:

*“Everyone was fighting locally to get their machine and at the federal level, we were fighting together to get reimbursed.”*

### **COMPARATIVE ANALYSIS: HOW THE INSTITUTIONAL CONTEXT SHAPES THE DIFFUSION PROCESS**

It is striking that neither of the two cases described suggests a highly ordered diffusion process driven primarily by a rational evaluation of patient needs, the equitable distribution of resources and cost effectiveness calculations. Rather, in both cases, as we have described, the technology diffusion process playing out over time is marked by two kinds of competitive and political struggles: horizontal struggles between different health care institutions competing to

acquire the technology faster than their rivals, and vertical struggles between would-be adopters and regulatory bodies attempting to influence diffusion, often by restraining it. As we have seen, these struggles manifest themselves in two distinct but interacting forms of action: struggles for control and struggles for meaning.

Actors engage in struggles for control by strategically mobilizing power in the form of material resources, authority and expertise. While the power of both governments lies partly in their authority to allow adoption or reimbursement, expertise often lies with potential adopters, giving them legitimacy in the struggle to control the diffusion of this technology. Material resources take the form of the capacity of actors to mobilize financial resources for the acquisition of a PET scanner. For example, in Quebec, the Ministry of Health has the authority to allow the adoption of expensive technology, but also often provides acquisition and operational budgets. In Switzerland, authority is diluted between the cantonal and the federal governments; while the former has material power to fund and to authorize acquisition, the latter has the authority to permit the reimbursement of the procedures which are paid by health care insurance. Hence, the governance structure determines who has access to material resources, authority and expertise thereby assigning roles, identities and responsibilities to institutional actors.

The struggle for the control of the diffusion of the PET scanner is mediated by the struggle for the meaning of the technology. Struggles for meaning are attempts by actors to gain legitimacy by providing an interpretation for a material object which is aligned with their own values and interests, and which manifests itself in the interplay of theorizations and counter-theorizations. Theorizations are strategically mobilized arguments aimed at legitimizing the purpose of a technology, the adequacy of a potential adopter to acquire such a technology, and the appropriate way to disseminate it. In turn, institutional logics provide a repertoire of cultural-cognitive resources that may be mobilized in theorizations.

Given this backdrop, the case study suggests a number of ways in which the institutional contexts influence the technology diffusion process. It is clear that institutional logics and governance structures interact and are mutually supportive in these cases. However, we separate them initially for analytical purposes in this discussion.

### **Institutional Logics and Struggles for Meaning**

Because the PET scanner is a complex technology whose applications were not initially clear, this technology left room for professionals to provide meaning to the PET scanner in ways that suited their interests. In both jurisdictions, the initial institutional battles to legitimate the technology and define its purposes occurred within a quality-based institutional logic.

Although a quality-based institutional logic was initially mobilized to legitimate the PET scanner and potential adopters, different institutional logics available in each institutional environment were used by actors to justify the way the PET scanner should subsequently be diffused. In each case, the legitimation strategy utilized was in the form of theorizations and was aligned with would-be adopter's interests. In Quebec, it was assumed that grounding the purpose of the technology in scientific evidence would increase the likelihood of obtaining the PET scanner and orient the diffusion of the PET scanner according to the interest of certain actors. The publication of the Health Technology Assessment Agency's report legitimated it as a useful clinical tool that needed to be further developed by research. This theorization was sanctioned by teaching hospitals who mobilized a quality-based institutional logic by underlining the importance of their competence to interpret PET scanner results, to disseminate this technology slowly, and to perform further research. However, the limited resources available generated struggles for the meaning of the technology. The quality-based theorization was counter-theorized with an access-based institutional logic by the medical association and regional hospitals to ensure that smaller hospitals would obtain this technolo-

gy. The theorization and counter-theorization between two factions tended to paralyze decision-making at least initially.

In Switzerland, while the government developed an efficiency and quality based theorization by contending that the reimbursement of PET scanner should be restricted to nominated centers for cost-containment and quality purposes and because it was still under evaluation, the private clinic used a free-market counter-theorization by arguing that providers should be able to freely practice medicine and that all organizations wishing to offer this service should be allowed to do so. Thus in each jurisdiction, institutional actors mobilized different institutional logics that best suited their values and interests, and through the interplay of theorization and counter-theorization they competed on institutionally established legitimate grounds to capture resources. As we have mentioned previously, the health care sector is well-known for accommodating multiple institutional logics and this is clearly apparent in this study.

However, because the governance structure of Quebec is a state-based model, there was no room for theorizations that built upon a market-based institutional logic, although the market-based institutional logic exists in other economic activity in Quebec. Mobilizing a market-based institutional logic is indeed absent from the rhetorical repertoire of institutional actors because market competition and profit are relative institutional taboos in this jurisdiction. In contrast, market competition in health care is institutionalized in Switzerland and institutional actors do not hesitate to draw on this institutional logic to defend their interests, or to become institutional entrepreneurs (DiMaggio, 1988), basing their action on institutional logics to accommodate the institutional environment to their needs.

We would add that contrary to Scott et al. (2000) who mingled efficiency-based and market-based institutional logics, this study suggests that these two logics are clearly distinct as suggested also by Boltanski and Thévenot (2006). While market logics insist on the impor-

tance of freedom to compete according to instrumental interests, efficiency logics give precedence to efficiency and economy, something that is not necessarily guaranteed by a market perspective. Given that this study compares the same type of economic activity (i.e. the health care sector), one interesting corollary is that identical economic sectors can carry different institutional logics affecting the content of the rhetorical field.

In sum, while institutional logics structure the behavior of actors by providing them with cognitive templates to organize social life (Friedland and Alford, 1991), they also enable actors to instrumentally select institutional logics to influence the perception of actors according to their own values and interest. Hence, the following proposition:

*Proposition 1: Institutional logics structure the institutional field by restraining the rhetorical possibilities, but also enable actors to gain legitimacy or provide legitimacy to objects by instrumentally selecting the logic that best suits their values and interests.*

### **Governance Structures and Struggles for Control**

As we noted in an earlier section, both jurisdictions share governance structures that to some extent pit organizations against one another in the competitive struggle to adopt new technology, and at the same time set bounds on this struggle through the use of regulatory bodies. However, there are some very important distinctions between the governance structures whose effects are evident in the patterns of diffusion described here.

For example, the governance structure of the Swiss health care system is highly fragmented and has two main cleavages: 1) The co-existence of market and public regulative regimes, and 2) the partial decentralization of the governance structure with responsibilities diluted between the cantonal and the federal governments, and the health care insurance companies. This has the effect of diluting the power of governments by providing more freedom to other actors in their struggles for control and for meaning.

In Switzerland, since the public (state model) and the private (market model) structures are two complementary and legitimate regimes, institutional actors may position themselves under the regime which best suits their interests. Indeed, while the federal government denied the request of a private clinic to be added on the reimbursement list, the private clinic instrumentally mobilized the free-market institutional logic to threaten the government. Thus, the availability of two institutional logics corresponding to two different regulatory regimes offers opportunities for organizations to challenge the authority of the federal government in Switzerland.

The public-private fragmentation of the Swiss health care system also allows organizations to bypass the regulation demanding that public organizations have authorization from the cantonal government before acquiring a PET scanner. Because private organizations are not subject to this law, some public hospitals found a strategy to acquire a PET scanner by subscribing to a private regime. For example, the presence of the private sphere helped teaching hospitals THN and THS to acquire the technology in the face of denial or hesitation from government. Moreover, despite the fact that the teaching hospital THS was not initially on the federal reimbursement list, the decentralization of the governance structure allowed it to pass a contract with the cantonal health insurance body to have PET scanner procedures reimbursed.

This contrasts with the Quebec health care system which is more centralized and coherent. Authorization to acquire technology as well as to obtain operating and acquisition budgets is granted by a single central authority. Because the legitimate means to access financial resources are concentrated in one place, actors draw first on institutional logics to build theorizations and counter-theorizations and to engage in legitimate discursive battles to convince authorities. Because there is no legitimate alternative mode of action in the case of government opposition to the acquisition of the PET scanner, actors' freedom is significantly lo-

wered in the short run. Overall, it is clear that the relative fragmentation of the Swiss governance structure provided greater freedom to institutional actors to strategically mobilize laws, rules, and institutional logics that suited their particular interests:

*Proposition 2: The fragmentation of a governance structures provides regulative slack or freedom to institutional actors who may choose which regime to comply with, thereby seeking their own interest while still being legitimate in the eye of the law.*

### **When Institutional Logics Preempt Governance Structures**

Although the governance structures in both jurisdictions gave theoretical control to regulatory agencies over certain key decisions (e.g., the authorization of adoptions in Quebec and reimbursement rules in Switzerland), we observed in both cases that when regulatory bodies found themselves in positions where their actions placed them in contradiction with dominant institutional logics embedded in the field, they were unable to sustain their positions.

Episode Q4 illustrates this phenomenon for the Quebec case. At the point where the PET scanner had acquired strong quality-based legitimacy through the Health Technology Assessment Report, it was no longer possible for the government to sustain objections to delinquent adoptions without losing credibility and political capital. To maintain face, the government was obliged to generate a dissemination plan that largely satisfied potential adopters. The delinquent yet entrepreneurial behavior of adopters was rendered legitimate when normative and cultural-cognitive forces were stronger than regulative forces.

Similarly, episode S2 illustrates a situation where the Swiss federal government was faced with a potential revolt concerning its reimbursement rules. While the private clinic PCS that legally contested these rules on the grounds of a market-based logic did not win its case, the Federal Department of Health was sufficiently worried about anti-trust issues that it modified its rules to open up diffusion, setting new rules that allowed the market-based logic to flourish within a quality-based framework.

Note that in both cases, entrepreneurial action that contravened current rules was required by health care providers to achieve adjustments in regulatory attitudes and requirements that fit dominant institutional logics. We label this type of entrepreneurial action “institution testing” and we formulate a final proposition:

*Proposition 3: Institution testing may result in change to regulatory constraints that speed up the diffusion of technology when the normative and cultural-cognitive legitimacies of the position defended are grounded in dominant institutional logics and have acquired sufficient force to trump regulatory legitimacy.*

## **DISCUSSION AND CONCLUSION**

In this discussion, we first consider the implications of the study for understanding the role of institutional contexts in the diffusion of bandwagon technology. We then broaden the perspective to look at its more general implications for the relationships among institutional governance structures, institutional logics and specific organizational decisions.

### **Institutional Contexts and the Spread of Bandwagon Technology**

As might have been expected, the PET scanner diffused more rapidly in Switzerland than in Quebec. The competitive environment of the Swiss health care system in which private and public health care institutions coexist and where there is relatively limited centralized decision making did enable hospitals to acquire the technology earlier. However, this broad global portrait hides diffusion process dynamics that have several similarities. Specifically, both cases were characterized by horizontal and vertical struggles that manifested themselves in attempts to define the technology in ways that favored particular actors and by strategic behaviors aimed at mobilizing material resources, authority and expertise to ensure desired outcomes.

Struggles for meaning were embedded in the mix of institutional logics (Scott et al., 2000) that underpinned the different health care systems. Thus, the most intensive struggles for meaning in the Quebec case involved competing theorizations about quality of care and

equity of access. In contrast, in the Swiss case, struggles for meaning developed around rights to compete in a free market and profitability as well as quality of care. Yet while multiple theorizations of the nature of the technology, its uses and the legitimacy of its acquirers were produced and exchanged, their impact was moderated by the power dynamics inherent in struggles for control, these in turn contingent on the structures of the respective health care systems.

Interestingly, while governments in both jurisdictions tried to manage the diffusion process, intense bandwagon pressures undermined these attempts, though in different ways. For example, in Switzerland, public hospitals found innovative ways to bypass opposition from cantonal authorities by creating private initiatives and collaborations where different rules applied. In Quebec, government inertia prompted one teaching hospital to adopt the technology without official government consent. The forms of strategic behavior used by adopters can also be related to institutionalized value systems. In Quebec, the high legitimacy of quality of care considerations established by the health technology assessment report was sufficient to override regulatory constraints, rendering institutional testing possible. In Switzerland, shared beliefs in the values of the free market contributed to legitimizing the behaviors.

Overall, the study shows that institutional contexts do indeed influence the patterns of diffusion and adoption of technologies through their impact on decision structures and available meanings. However, the underlying pressures for adoption associated with the bandwagon technology remain, giving rise to intense vertical and horizontal struggles whose form and outcomes may change but whose processual dynamics are remarkably similar.

### **Governance Structures, Institutional Logics and the Testing of Institutions**

Beyond the pragmatic issue of the spread of technological innovations, the approach and findings of this study has some broader implications for institutional theory. Specifically,

the study shows how institutional structures and meanings may manifest themselves in the context of specific decisions within an organizational field. The particular decisions we considered required interactions and negotiations among multiple institutional agents embedded within the same institutional environment. The type of analysis we conducted here could be extended to multi-agent decisions in other institutional settings constituted around similar and different kinds of economic activity. Specifically, we argue that governance structures influence these processes by determining the patterns of material resources and authority available to actors in their struggles for control over decisions that concern them, while institutional logics constitute the discursive resources on which agents may legitimately and creatively draw to give meaning to their actions.

In the study presented here, meaning-making through theorization was an important activity in part because the governance structures in place demanded it. Thus while meaning systems are indeed crucial in institutional analysis, we argue with Scott (2008) that attention also needs to be given to the structural arrangements surrounding and supporting them and to the multiple ways in which institutional logics and governance structures interact. As we saw, in the health care domain, certain governance structures within an organizational field may enable institutional pluralism (Kraatz and Block, 2008), generating struggles for meaning both within institutional logics and between them. The nature and outcomes of these struggles, as well as the way in which they are resolved (through discourse or through the mobilization of material resources) may provide hints as to the direction of future institutional shifts.

This brings us to the possible implications of the study for institutional change. We focused mainly in this study on how institutional environments influenced the dynamics of technology diffusion rather than on how these processes might eventually influence institutional environments. Yet the phenomenon of “institution testing” identified in both Quebec and Switzerland (see proposition 3) where entrepreneurial actors contested existing regulatory

constraints (through unilateral action in one case and legal challenge in the other) suggests that there are potential reciprocal influences.

In these particular cases, the underlying normative and cultural-cognitive legitimacy of the institution-testing actions ultimately trumped regulatory legitimacy. Faced with a contest they felt they could not win, government actors quickly adjusted regulatory constraints to realign them with dominant institutional logics, preserving rather than fundamentally changing underlying belief systems and governance structures. Thus the process of institution testing and adjustment described here largely reproduced the institutional order. Nevertheless, over time, such contests could lead to more fundamental change. For example, the fragility of the government's stance in blocking technology adoptions in the Quebec health care system is starkly revealed by this case study. One might hypothesize that in future cases, institution testing will be easier since there are precedents that have been tolerated and that make it more legitimate. It is possible that over time such testing will lead to more profound shifts not only in structures but in institutional logics.

In the literature, entrepreneurial actions that contest institutions have generally been labeled "institutional entrepreneurship" (Hardy and Maguire, 2008; Lawrence and Suddaby, 2006)). We believe that this term is too strong in its connotations to reflect the kinds of institution testing on the margins that we observed. Although they were "entrepreneurs" in the sense of proactively pushing back regulatory boundaries, the people involved seemed motivated more by the short-term instrumental goal of acquiring a technology, rather than by a determination to disrupt institutions. Nevertheless, through their strategic actions and their theorizations, they were – though perhaps unwittingly – doing a form of "institutional work" (Lawrence and Suddaby, 2006) with potential to generate incremental institutional adjustment. So, too, were the government actors who moved to preserve the integrity of their rule systems (and their own credibility) in the face of this testing.

We suggest that these episodes of institution testing and reaction at the margins constitute one mechanism by which institutional frameworks may be stretched, reproduced and ultimately redefined in an organic and gradual manner as concrete problems and controversies succeed one another. Such a perspective helps contribute a much needed and much called for dynamic and recursive element to institutional analysis (Scott, 2008; Lawrence and Suddaby, 2006). In other words, while the struggles for meaning and the struggles for control surrounding specific issues within an organizational field clearly reflect the institutional contexts in which they are embedded, they may also contribute to the recursive reproduction and adaptation of those contexts, especially when the boundaries of legitimate struggle are tested.

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