

Changing organizational models of IT departments as a result of cloud computing: proposal for a typology

Sébastien TRAN* & Emmanuel BERTIN**

*ISC Paris

**Orange Labs

ABSTRACT

The standard models for IS conception and consumption are today challenged by the new ways for business departments and end users to subscribe directly online to IT services through cloud computing. These changes in use and practices call into question the organizational models of IT departments. The aim of this paper is to propose a typology of the relationships between IS and their stakeholders. Four models are proposed and discussed – IS as a product, IS as a service, IS as access and IS as a platform, with each model entailing specific power relationships.

Keywords: Cloud Computing, IT department, typology study, case study.

RÉSUMÉ

Les modes usuels de conception et de consommation du SI sont aujourd'hui challengés par les nouvelles possibilités qu'ont les directions métier ou même les utilisateurs de souscrire directement des services IT en ligne grâce au Cloud Computing. Ces évolutions dans les usages et les pratiques questionnent fortement les rôles et le positionnement de la DSI. L'objectif de cet article est de proposer une typologie des relations entre le SI et les entités parties-prenantes dans sa conception. Quatre modèles sont ainsi proposés et discutés : IS as a product, IS as a service, IS as an access et IS as a platform, chaque modèle induisant des modalités relationnelles spécifiques.

Mots-clés : Cloud computing, DSI, typologie, études de cas.

1. INTRODUCTION

In our day-to-day work, we are seeing the emergence of new forms of organization, supported by new technological possibilities, which, in turn, give rise to new expectations regarding IS (Elie-dit-Cosaque, 2011; CIGREF, 2014). A key evolution is the increased technological empowerment of employees that puts them in a position to choose their own IT tools for their professional activities. A first trend has involved employees using their personal devices in the workplace (Bring Your Own Device - BYOD). While this practice has raised issues for IT departments on information security and integrity, it has not questioned its specific role. This trend is today being supplemented and extended by cloud computing, through which the various stakeholders gain many advantages (ease of use, reduced infrastructure costs, economies of scale in data centers, lower maintenance and updating costs, etc.) (Marston *et al.*, 2011). There are many definitions of cloud computing, and of those found in the literature, we adopt the most exhaustive definition provided by Marston *et al.* (2011): *"It is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location. The resources required to provide the requisite quality-of-service levels are shared, dynamically scalable, rapidly provisioned, virtualized and released with minimal service provider interaction. Users pay for the service as an operating expense without incurring any significant ini-*

tial capital expenditure, with the cloud services employing a metering system that divides the computing resource in appropriate blocks".

This definition emphasizes how cloud computing is bringing a form of consumerization that remains little studied to date in IS research (Tiers *et al.*, 2014). The cloud opens the way for increased "servicization" of IS through the introduction of competition among IT services internal to the enterprise (i.e. implemented by the IT department), with external services meeting the same business needs, in a scalable manner, with on-demand payment based on the resources consumed (Motahari-Nezhad *et al.*, 2009; Marston *et al.*, 2011). This trend is impacting all businesses, whatever their size (Sultan, 2011). Globally, the market for cloud computing public services is likely to increase from 56.6 billion dollars in 2014 to 127.5 billion in 2017, including about 70% for SaaS services (c.f. section 2.1), according to the market intelligence firm IDC (Gens, 2014). In a context where the growth potential of companies linked to the digitalization of business functions is regularly underlined, these trends clearly call into question the role of the IT department. Some analysts go so far as to wondering about its possible disappearance, since its organizational value seems tightly linked to the internal provision of IT services, as Davis (2000) points out: *"The term information systems also refers to the management of the organizational function in charge of planning, designing, developing, implementing, and operating the systems and providing services."*

In this context, if academic research on cloud computing has focused primarily on technological and security aspects (Tiers *et al.*, 2014), it seems necessary to better characterize its impacts in terms of IT department's organizational models. Indeed cloud computing remains under explored within the academic literature (Bhattacharjee and Park, 2013), especially regarding its impact on the relationship between CIOs and business units. While the alignment of the IT function with business objectives must not only be understood, but constantly renewed and adjusted (Guillemette et Paré, 2012), CIOs need to analyze the benefits and risks of cloud computing along with its impact on business along with short-term and a long-term plans for deployment (Dhar, 2012).

To characterize the changing roles and organization of the IT department induced by the emergence of cloud computing, we propose here to study the types of interactions between an IT service and the company's main stakeholders. Our goal is to propose a typology describing the design and consumption methods of IT services by identifying relational modalities among the various actors at a time when the role of the IT department seems blurring; no longer limited to technical aspects of operating services (Guillemette and Paré, 2011, 2012; Zammuto *et al.*, 2007), but also sometimes no more even including these aspects. As a first step, we define cloud computing, along with its various forms and its main properties. We also present a theoretical framework, enabling us to define interactional constructs among the different stakehold-

ers. We then illustrate our theoretical framework with two case studies of cloud computing configuration. The following section is devoted to the construction and presentation of a typology of different models of IT department organization. In our final part, we discuss this typology with a comparative analysis of the organizational models identified and present a possible future model that seems very promising for the IT department in terms of value creation.

2. THE IMPACT OF CLOUD COMPUTING ON IT DEPARTMENT ORGANIZATIONAL MODELS

Apart from the technological component, information systems features generate strong interactions between diversely depicted groups of actors that do not have the same hierarchical power and influence in the organization. These different components suggest the difficulty in objectively thinking about IS, i.e. the modeling of a certain reality that is therefore necessarily "situated".

2.1. How does cloud computing transform the role of actors and in particular that of the IT department?

There are various definitions of cloud computing in the literature (Boucher, 2009; Marston *et al.*, 2011; Sultan, 2011; Tiers *et al.*, 2014). In all these definitions, common properties can be identified. Firstly, a more efficient use of outsourced resources

(hardware and software), that can be optimized (“highly scalable”) and virtualized. Secondly, the payment made on use, which amounts to a form of outsourcing in real-time according to the practices and pace of use. The definitions also distinguish three forms of cloud computing, the first being the most prevalent. The first, SaaS (Software as a Service), is the capability for a customer to use his provider’s application (software) when it is run on the provider’s infrastructure. The second, PaaS (Platform as a Service), is the provision of a virtual and scalable software execution platform, dedicated to a customer on the provider’s infrastructure and billed on the basis of consumption. The third, IaaS (Infrastructure as a Service), is the provision of a virtualized infrastructure by a provider to its customer so that the latter benefits from basic computing resources in order to run its own software. The added value of cloud computing thus lies in its decentralized nature (Iyer and Henderson, 2010; Fouquet and Carle, 2009), which must be placed in an outsourcing context (Lacity and Willcocks, 2013; Rivard and Aubert, 2007; Fimbel, 2003), while offering IT resources seemingly infinite in capacity (Armbrust *et al.*, 2009; Mikkilineni and Sarathy, 2009).

One explanation for the diffusion of cloud computing solutions is that users themselves find major benefits in using them (Bhattacharjee and Park, 2013). This is an explanation that is consistent with known IS appropriation models (Davis, 1989; Delone and McLean, 2003; Venkatesh *et al.*, 2003). This logic is reinforced by the constant search to reduce infrastructure costs and share re-

sources between business departments. Moreover, cloud computing allows companies to provide systems more in line with current interface standards (GUI – Graphical User Interface, but also API – Application Programming Interface). This relationship is reinforced by consumerization, which promotes the development of new tools in the company, bringing with them a new culture of design (Tiers *et al.*, 2014), not to mention the opportunities for users to bypass workstation tools and to deploy Web-based external tools that they are able to control better. Lightweight customer solutions and the virtualization or “Webization” of applications are now easily accessible technical answers at minimal cost. Cloud computing may thus well amount to a new paradigm where users are led to have an increasingly central position in their relationship to the IT department (Bhattacharjee and Park, 2013).

Furthermore, since these external tools can improve the competitiveness of organizations through their properties, it becomes logical to develop a “cloud computing strategy” that is likely to determine which applications and infrastructure should be outsourced (Marston *et al.*, 2011). Information systems can thus play the role of “flexibility tools” aiming to respond more quickly to an external request (Pavlou and El Sawy, 2010). One of the main trends is to position IT departments as major contributors to meet the challenges encountered by business departments, so as to better highlight their added value (Guillemette and Paré, 2012) in accordance with different possible organizational models: the IT department may thus adopt an op-

erational profile as a partner, systems provider, architecture designer, technology leader or project coordinator (Guillemette and Paré, 2011). This has to be understood within the context of loss of control of certain tools and pressure from the environment. This is particularly the case of software editors and consultants, who can now communicate more easily with users and business departments (Tiers *et al.*, 2014).

An analysis based on typology is appropriate for investigating this issue. Typologies are, in fact, complex theoretical constructions intended to comprehend the evolution of organizational models from unique combinations of attributes (Doty and Glick, 1994). This representation tool facilitates the analysis of complex phenomena that cannot be simply analyzed on the basis of linear theories. It provides us with an in-depth understanding of the contribution of IT departments in relation to business departments and users in particular. Since we are interested in the relationships between the main stakeholders (IT departments, business departments, users and software editors/consultants), we have sought the most appropriate theoretical framework for identifying possible interactional constructs. Among the different approaches to the technology, that of the structurationist paradigm seems particularly relevant for examining IS by incorporating the technological dimension into organizational change (Orlikowski and Iacono, 2001). This approach allows us to better understand the mechanisms at work in the appropriation of technologies, by broadening the analysis to the interactions and mutual influences among ac-

tors, the focal point of the construction of our typology.

2.2. Identification of the interactional constructs between IS actors

The starting point in this theoretical framework is to consider the organization as a social construct structured by individual or collective actors and by systems of relationships and communication. Yet IS are involved in these interactions, and contribute to the strengthening or the modification of these social structures (Leclercq-Vandelanoitte, 2010). Understanding technology as both an external objective force and as a socially constructed object breaks with a deterministic tradition that has dominated IS and the organizational research advocating simple causal relationships. In this context, an IS can be likened to *“a set of social actors who memorize and transform representations via information technologies and operating procedures”* according to Reix and Rowe (2002, p. 7). The structurationist framework offers a better understanding of the mechanisms at work in the appropriation of technologies, by broadening the analysis to the interactions and mutual influences between actors. This framework thus makes it possible to move from a view of an “imposed” system, in the technical-productive approach, to a “constructed” system in which joint regulation between the actors is established, so as to define the internal (explicit and implicit) operating rules and uses.

The first consequence of the servitization of IS by cloud computing is

the strengthening of a logic of co-design of tools between stakeholders, with the growing weight of users and business departments. In addition there is an interactionist logic between actors, reinforced by the increased porosity of everyone's role, a logic that comes into force in particular at key moments in the lifecycle of the IS, that can be broken down into the specifications, production and exploitation phases. Some studies stemming from the theory of human agency also enrich the conception of the user by focusing on the cognitive complexity of tasks (Azan and Beldi, 2010). These studies recognize that users can play more than one role at a time. Thus their role as a simple user tends to converge and sometimes merge with that of the developer. Many critics have also emerged in opposition to the concept of user, in particular a research trend commonly known as "Computer Supported Cooperative Work" (CSCW). These researchers draw on the socio-technical approach, but reject any distinction between the developers and users of IS. Users view themselves as professionals, working with others and using IT services as the medium for their interaction (Lamb and Kling, 2003). However, such actors are not decontextualized, but are influenced by their environment, both human and technological.

The second explanatory variable of relational modalities between actors is their influence through discourse and mimetic behavior (Girard, 1961). This framework makes sense in the analysis not by limiting itself to an internal view of the organization, but by taking into account an institutional analysis with

the organizing perspective proposed by Swanson and Ramiller (1997), that can be defined as *"the product resulting from the combined efforts of the members of an inter-organizational heterogeneous community in the construction of meaning around a technological innovation seen as an organizational opportunity. The different members of this community thereby participated in the creation of this innovation and the definition of its characteristics [...] the organizing perspective is the focal idea of the community regarding the application of IS in the organization"* (p. 459). According to these authors, the choice and implementation modalities of a new information technology in an organization are not isolated, local phenomena but are strongly influenced by the discourses, forums and specialized magazines created by external actors (consultants, computer manufacturers, competitors, suppliers, etc.). The process of appropriation of a technology by the organization is therefore an open social phenomenon, fed by the media cycle linked to this new technology. The role of the specialist press and consultants has also been highlighted in various studies and publications (Swanson and Ramiller, 1997), showing their influence in IS equipment decisions. Moreover, for a number of years now, there has been a proliferation and growing influence of specialized websites (Zdnet, Journal du Net, Frenchweb.fr, Maddyness, etc.), consulting firms and IT services companies (Alten, Bearing Point, Ernst & Young, Altran, etc.), famous bloggers (Chris Anderson, Frédéric Cavazza, Bertrand Duperrin, etc.), communities (EBG, Linux, etc.) in company

choices with regard to IS. These actors largely relay their discourses on social networks concerned with new practices and technologies.

Furthermore, many providers have emerged to alleviate the rigidity of certain IS solutions proposed by the historical actors, with lightweight Web-based applications, available online in cloud computing mode, and presenting themselves as better able to meet the expectations of business departments. These technologies allow remote access to work areas and change the traditional space-time of the company (Elie-dit-Cosaque, 2011). In this context, it is also important to take into account mimetic behavior regarding IS choices, especially in relation to dominant players. These trends have also favored the interpenetration of applications between the professional sphere and the personal sphere, thereby helping to increase the porosity of the borders of organizations (Dénervaud *et al.*, 2012; Guesmi and Rallet, 2012). Most Internet users have developed uses and learning in their personal sphere that may be similar to routines (Baskerville, 2011) and which should be taken into account by the developers of professional applications¹.

The final explanatory variable is sensemaking and enactment by actors. Using technology, individuals are re-defining structures, practices and even the technology itself. Saga and Zmud

(1996) speak of the emerging usage: transformations within a structuring process, which takes place as users appropriate the technology and implement it in the daily exercise of their tasks. Individuals “enact” the technology and, by using it in their social activities, help update it through a recursive relationship. By interpreting the technology in a given environment, people progressively build their relationship with it. In line with this approach, DeSanctis and Poole’s (1994) adaptive structuration theory should also be mentioned. It provides a theoretical framework for linking technology, social structures and interactions between individuals.

This theoretical framework, that incorporates the material perspective and certain aspects of the extended view of technology, has given rise to numerous studies on the contextualization of meaning related to the use of information services. Weick (1990, 2000) thus points out that “technology is equivocal”, especially with regards to information technologies. It is essential to take into account the actions and interactions of the individuals and groups using the technologies, who will therefore develop their own understanding. These are the players in the organization who give meaning to technology and information, in a collective and interactionist logic that is expressed in Weick’s writings by the notion of sensemaking (1995). Interactions between individuals produce a

¹ By way of information, according to eMarketer, by 2012 nearly 21% of the world’s population was using social networks at least once a month. On the basis of projections, this rate is expected increase to over 34% by 2017. In a study conducted by a consulting firm, 84% of respondents reported using personal devices (PC, phone, etc.) for professional purposes (Dénervaud *et al.*, 2012).

construction of meaning that is materialized by the establishment of more or less permanent communication contexts. These contexts are interpretive schemes, that is to say, shared knowledge and frameworks of knowledge, that also act as mediators of communication and aid decision-making. As we mentioned above, the expectations and meanings that the actors of the organization project onto IS are also based on their habits in the personal sphere, including the consumption, according to choice and habit, of online IT applications (for example, social networks such as Facebook and Twitter).

Finally, an IT department also plays an institutional role, because it conveys meaning and a management philosophy characteristic of the organization. This institutional position is now being challenged by the empowerment of business departments and teams in organizations that may extend to choosing their own applications, a risk highlighted by a CIGREF report (2012).² This tension is accentuated with cloud computing through the ability of actors to access applications outside of the company that are hosted on the Internet, without even IT departments being informed beforehand. It can be observed that certain applications and practices are very present in the way the actors of the organization operate. Thus they will “google” someone or “make a Doodle pole”, without using a business application designed

for this purpose. Taking this reasoning further, these expressions reflect a form of application labeling and help give them a vector of meaning and practices within organizations. IS can, in this way, be partially deprived of its institutional role to the advantage of external actors, with a powerful influence capacity on IS users directly (especially through their strong position in the personal sphere), rather than on the IT department.

3. PRESENTATION OF TWO CONFIGURATIONS OF THE IT DEPARTMENT FACED BY CLOUD COMPUTING

With our research question in mind, we decided to select a qualitative methodology. Understanding the different configurations of an exploratory typology requires a detailed analysis to distinguish the different possible cases. Qualitative research aims to analyze actors according to their actions. It is based on the discourse of these actors, their intentions (the “why” of the action), and the modalities of their actions and interactions (the “how” of the action) (Dumez, 2013). Eisenhardt (1989) suggests that researchers conducting multiple sites case studies should identify their theoretical unit of interest and carefully select the case sites so as to produce sufficient variation in the variables of greatest research interest. The choice of case studies thus allows us to explore complex and poorly under-

² “With the advent of cloud computing, there is a risk that business departments outsource their services. The temptation not to go through the internal provider, i.e. the IT department, is therefore a growing factor, especially in a context of crisis, where the search for financial efficiency often takes precedence over thinking about the architecture of IS and about security.” (CIGREF, 2012).

stood phenomena so as to capture its richness and identify from its patterns a perspective for generalizing the theory (Eisenhardt, 1989; Dougherty, 2002; Yin, 2003). We selected two representative and different cases of cloud computing use (firm's size, industry area, stage development of IS, etc.). These two case studies allow us to illustrate and enrich our thinking with regard to developing the typology presented in the next section. The first case is in a SME with an evolution of its IS to support the business development in the higher education area. The second case is a global company with multiple entities located in the world that aim to change its firm's culture in the industry area. We used primary and secondary data from our two case studies to manually code and determine the causal relationships between the different business units (an example can be found in annex A). The models synthesizing the causal relationships between entities were presented to a workgroup within the CIGREF³.

3.1. The case of a higher education institution: a cloud computing in a service logic

This case study is situated in a research work started in 2012 and currently still in progress. Being responsible for several internal processes in a higher education institution, we were chosen to be a member of the steering committee in charge of monitoring a change of ERP and of several dedicated applications, some of them SaaS,

for management departments. We thus attended some twenty steering committee meetings and were able to collect extensive material for the analysis of the case (minutes of the steering committee and the management committee, the cartography of business processes, internal and external audit reports on user requirements and the technical aspects pertaining to IS, the editor's PowerPoint presentation, communication notes internal to the establishment, and a satisfaction survey on IS). We were able to work closely with the institution's IT department and the different management departments, all of which were involved with the deployment of the new tool. Our participation in the steering committee allowed us to compare the viewpoints of all the business departments through progress reports.

The higher education institution located in Normandy (France) decided in 2012 to change its IS, which was based primarily on a business IS with initially two SaaS applications for the Human Resources (HR portal) and accounting tasks (expense account and mission orders software). The IS no longer met the needs of users and management because it was seen as outdated, dysfunctional and in particular very limited in terms of configuration options for facilitating business intelligence-type operations. The newly recruited CIO and his teams also supported this decision. A steering committee was therefore created to carry out a needs analysis among the different business departments and examine

³ The CIGREF is a French industry association devoted to enable large companies to develop and to leverage digital capabilities. Members include 97% of CAC 40 and 50% of Euronext 100.

the existing provision of ERP in the market. A consulting firm was also called in to help the business departments to implement a review of their processes, including their formalization. The steering committee thus identified nine processes, all of which were specific and clearly differentiated in terms of needs. These business processes correspond to the school's business departments (HR, Finance Department, Program Direction, Corporate Relations Office, etc.) and are run by one or more managers. During this phase, the units linked to the main department (i.e. the Program Direction) expressed the clear determination to acquire IS tools suited to their needs in light of the evolution and size of the institution at the time.

The situation of the business school: when the change of ERP generates the implementation of cloud computing solutions for certain more autonomous business departments

The business school numbers 2,400 students and 190 staff around a large Master program with four campuses geographically distributed in different towns. The IT department team comprises a director and five people employed in the front and back offices. An audit by a specialized firm underscored the obsolescence of the ERP (Auriwin) and the short-term risks, leading management to choose a new ERP solution, namely E-Charlemagne. The new ERP system is based on two full web servers with Windows implementation. A 14-members

steering committee was created to represent the nine business processes. This overhaul of the business ERP was the opportunity for some business departments to rework their business processes and to move forward other IS choices, emphasizing their strategic and performance goals (logic of decentralization of power with size). Other applications deployed were Cegedim, Cegid, Netanswer, Schoolbox, Hivebrite and Alexandria.

After several months of analysis, it turns out that the needs of the business departments are very specific (e.g. the department managing the network of alumni for their follow-up and relational marketing, the marketing department for the management of prospects and tracking student applications, the programs department for publishing academic reports and tracking students abroad, etc.) and that no ERP can satisfy all the specifications aggregating the needs of the various business departments. The review of processes conducted by an external audit firm highlights the need to establish very specific IT tools for the business departments. These tools are not included in the IS chosen, namely Konosys, which is akin to a configurable ERP and is hosted on the school's servers. The audit also underlined the problems of the division of responsibilities and the boundaries between certain business departments, in particular for data at the interface between processes. Moreover, this state of affairs occurs in a context of strong growth, with the establishment of business departments that are becoming more independent, and in view also of the school's four geograph-

ically distributed campuses. The decision was then taken that each business department could eventually become a project contractor and select the best application for its specifications, in addition

to a business ERP selected by the steering committee, in which the IT department participates, with responsibility for managing the overall consistency of IS architecture.

Business process	Sub-processes	Business departments concerned	IS used
Prospecting and recruiting	Administrative management of competitive exams Recruitment/prospecting	Competitive exams center Promotion department	Business ERP CRM tool (Company Relations)
Integrating students – administrative follow-up from entry to leaving	Master's Program Other programs	Program department	Business ERP
Management of teaching follow-up up to Diploma Supplement	Absence Grades and credits Pedagogic management of missions / exams / courses Educational projects and community life Student graduation Establishing a Diploma Supplement	Program department Student services department International Relations department	Business ERP Schoolbox (Intranet)
Management training design and training planning	Management of syllabus and its evolution Course planning management	Program department IT department	Business ERP Schoolbox
Managing relations with external partners	Management incoming/outgoing students Corporate partnerships Management of traineeships and missions	SR department Corporate Relations department Program department	Business ERP Schoolbox
Publicizing and organizing events	Events network Press	Alumni department Communication department	Business ERP
Obtaining funding – managing the apprenticeship tax	Funding Apprenticeship tax	External relations department Financial affairs department	Business ERP CRM tool
Graduate follow-up		Alumni department	Business ERP Dedicated IS currently being selected (Hivebrite)
Managing administration and finance	Billing Tracking external and regular contributors	Program department Financial affairs department HR department	Business ERP Cegedim HRIS (Saas solution) Notilus (finance) (Saas solution)

Table 1. Description of IS business processes and actors

In addition to the core business, ERP focused on teaching and students, some specific dedicated IS were set up, as shown in Table 1 (Cegedim HRIS, a Moodle platform, Notilus accounting software, a CRM tool, Schoolbox intranet, Hivebrite), some of them as SaaS. Note the search for interconnecting links between hosted solutions and SaaS solutions (for example, between the new ERP and Cegedim HRIS), though this is not necessarily systematic. The IT department often seeks to be proactive, but the business departments do not always agree, especially since the IT department is not directly reporting to the CEO. For example, the institution's IT department has deployed Office 365 on all workstations, and this

incorporates an enterprise social network with Yammer. However, the business department that steers the management of the alumni network is looking for another social networking tool (Hivebrite), despite the recommendations of the IT department. This business department has its own operating budget and enjoys considerable autonomy, since it is controlled by external governance with several former graduates of the institution. Part of the costs of dedicated IS, other than the ERP, are analytically allocated to the departments concerned. The IT department has also been responsible for developing the technical infrastructure and the network in order to meet the needs of the various applications selected.

	<i>Primary/secondary data</i>	<i>Analysis</i>
Interactionist logic and co-design	• The internal audit firm consulted all business departments with semi-structured interviews lasting one hour (10 people in total). • Business process referees have been appointed for the deployment of the new ERP. • Samples of pilot users were selected during deployment and for the testing stages. • Each key business department is represented in the steering committee of the new IS. Impacts on the nature of tasks have been explored, especially for manager's assistants. • An online survey mid-way through deployment was also administered, particularly for training. • Some users have been invited to join the steering committee for implementing the new ERP.	• The new IT department wanted to better take into account user needs by introducing more frequent dialogue with the business departments. For instance, an online exchange platform has been set up on the Intranet for communication between users and the IT department. • Users and the IT department are also represented on the steering committee of the new IS, with regular meetings and working groups in terms of functionality and the configuration of interfaces (particularly ergonomics). The steering committee is clearly positioned in the documents as project contractor. • The IT department nevertheless retains complete control of the network and the technical architecture and officiates as prescriber/consultant to business departments. It also retains control of the overall urbanization pattern of information services. • The steering committee enables more frequent dialogue between the IT department and the business departments.

	<i>Primary/secondary data</i>	<i>Analysis</i>
Influence of the environment and the personal sphere	• A network technical analysis firm and a consulting firm were requested to review internal processes even though the institution has its own IT department. • The IT department carried out monitoring of the solutions chosen by the schools and several meetings were held for feedback with two other institutions that have chosen the same ERP. • A survey was administered to internal users regarding their needs and the tools used, including some tools not included in the institution's provision (in particular Dropbox, Yammer, Twitter, Doodle and Limesurvey).	• Two external firms were mobilized before the choice of the new IS (one for the technical aspects, the other for the organizational aspects). • The choice of new tools was made taking into account, as far as possible, the habits and procedures of users. For example the choice of Office 365 was motivated by the fact that this is a solution easily accessible externally, at least cost, and incorporates features aligned with social networks (e.g. Yammer integrated into Office 365). Tools such as Doodle and Limesurvey were deployed by a number of users in different departments without consulting the IT department to address the shortcomings of the existing information system.
Enactment and Sensemaking	• Each key department present in the executive committee was able when it wished to choose an IS suited to its needs (Schoolbox for teaching, Notilus for Financial Affairs, Cegedim for HR, etc.) in a logic of increasingly advanced performance on the basis of its own criteria, then linked to team performance indicators for the annual discussions. • The documents produced point to a goal of greater transparency and exchange in terms of information between the business departments. • The IT department and programs department wanted to choose the best technology solutions but also with the idea of being able to communicate outside (choosing Apple as a supplier for Ipad for staff and students, online registration in full-web), in particular to change the image perceived by potential students and companies. • A newsletter was created specifically to share the project's progress and was validated by the steering committee with the idea of placing the emphasis more on processes than on technology.	• The direction of the institution has strengthened the autonomy and the weight of each key business department by leaving them to choose the IS appropriate for their use. Moreover this has allowed sensemaking operating modes to be transmitted to the teams concerned. With Notilus and Cegedim, each employee accesses the portal via a Web interface and is free to make his/her requests, which are then validated by the N + 1. This represents an outsourcing of tasks and provides more autonomy for employees. • Increased size and geographical location on several campuses requires the provision of easier access to data. • The evolution of the IS has also accompanied change, in order to promote an image of a more modern and innovative school. Some functionalities have been made available for teaching staff and students (shared calendar available online, wiki spaces, information sent by SMS, etc.).

Table 2. Analysis of primary and secondary data from the theoretical analysis grid

3.2. The deployment of Google applications at Valeo: cloud computing in a logic of access

This case study at Valeo is part of an ANR project (Pilot Project 2.0). The objective was to develop an IT platform with deployment of a tool for piloting the company's entities into a "2.0" logic. Data collection was based on qualitative study with the MNM consulting firm from December 2007 to June 2010 (either in the consulting firm or externally for the implementation of interviews, information search, participation in professional conferences, etc.). The interviews were conducted in particular with the head of MNM Consulting, three MNM Consulting consultants, Valeo's IT department and the Group Office Information System Director at Valeo (GOISD), who is responsible for the deployment of Google applications.

Valeo's situation: when cloud computing acts as one of the levers for changing the organization of a large company

Valeo is an independent international industrial group specializing in the design, manufacture and sale of components and module systems for cars and trucks. In 2004, Valeo's Director of Information Systems turned to MNM Consulting to solve problems of strategy implementation and of differences in maturity between its sites (emerging markets, acquisitions, disposals of entities, etc.). Valeo's organizational performance is based on a balance be-

tween autonomy and standardization: the operational entities are autonomous in implementing the group's strategy, but are required to follow a number of procedures and standards formalized by senior management. To improve the visibility and effectiveness of the implementation of these principles, in a first stage, Valeo's IT department was given the task of facilitating the appropriation of a management tool (Roadmap Manager), which sought to harmonize and disseminate best practices in all Valeo entities, given that it is a sizable organization (70,000 employees in 30 countries, and 13 branches representing nearly 130 divisions). In parallel, work was carried out to deploy Google applications so as to intensify the implementation of a new "2.0" culture.

The evolution of the IS was initially launched by senior management within a traditional IT program logic (project management) and a continuation of other programs deployed internally. It also aimed to improve collaboration and exchange between teams, which amounted to an attempt at changing a very "top-down" corporate culture in terms of management. Valeo then decided to use SaaS Google Apps (pay service providing) to replace Lotus servers, as a result of progress in cloud computing technology. One of MNM Consulting's developers confirmed the idea of a convergence of IS without going all the way to full integration: "the applications developed for management roadmaps should be integrated into the new Google framework (messaging, applications' sharing, etc.)."

The sphere of teamwork was the least equipped at Valeo in terms of applications and was an ideal context for the development of applications for cloud computing, in order to foster collaboration between actors. In addition, the in-house IS had not reached the expected level of performance and it was clear that there was a growing internal need for de-compartmentalization and collaboration between the different departments, which were still operating in silos. It is interesting to note that the work stemmed from teams' requests for collaborative tools. The deployment of applications was based on a principle of discovery for users, starting from a premise of "adoption through uses" (Valeo GOISD). If applications create added value and are perceived as "problem solvers", internal actors will naturally propagate them within the organization. The applications developed also very much function in accordance with the principle of "self service" (Valeo GOISD). Thus Google sites at Valeo have been made available to actors, rather than being imposed. The choice of Google applications (Gmail, Google websites, RSS feeds, etc.) is explained by their level of maturity with regard to the internal issues of team sphere. A project to create a customizable personal portal for each individual was also under development at Valeo.

SaaS applications also call into question the security logic of IS, because each content and each sphere must now carry with them the access control: "it is no longer a matter of perimeter security but of the security of objects in their context" (head of MNM

Consulting). There is therefore a junction between the uses and the design of services (for example, Google websites and the need to descend a notch by securing access to certain data within the Extranet created and not simply access to the Extranet). Internally, the idea of "Strategy 2.0" was used to signify the importance of these applications and their integration in the processes. Finally, the phenomenon of cloud computing helps the IT department to become "less technical and more functional" (Valeo IT department), which has been a marked trend for several years. The mission of the IT department at Valeo is thus "to support collaboration in the organization" (Valeo IT department). Valeo IT department has played a key role in the development of different SaaS applications in a logic of self-service, as it understood that it would be difficult to achieve an integrated system. Rather than being in a position of mere technical provider, the IT department chooses to advise the business departments on adaptable and flexible solutions in accordance with their needs, in that it might be limited in terms of resources and expertise, given the technological change in the information systems: "Valeo does not possess a logic of innovation to its IS. We are more followers. We adopt robust solutions made by market leaders" (Valeo IT department). The IT department has thus capitalized on its consulting and support expertise in order to offer the business departments the use of SaaS solutions (e.g. Google Apps for Business), both to meet the needs of the most requesting departments and to generalize the scheme in the group.

	<i>Primary/secondary data</i>	<i>Analysis</i>
Interactionist logic and co-design	• A joint team of engineers and managers studied the migration to online tools. • According to GOISD, "the online tools allow a stronger focus between uses and users interactions." • Internal customers were listened to so as to identify their needs. • The logic is based on the provision of a range of different tools so that it meets the various needs of users. The idea is also to promote internal collaboration tools to reinforce "the team sphere."	• Valeo has established a "self service" logic that leaves the choice of tools to users and provides more collaborative tools. • Regarding MNM Consulting developers, the idea is that the functions in 2.0 are more intuitive and facilitate mutual aid between users in a more community spirit. This is one of the reasons for developing the IS (allowing the transmission of another form of management relying more on exchanges between users). • A logic of tool offering by the IT department, with the idea to create a dialogue with users.
Influence of the environment and the personal sphere	• Applications are selected by adopting a leading environmental actor, namely Google, for the new working environment in addition to existing tools internally (Lotus databases, shared directory, PS Next and MS Project). Valeo pays Google for its SaaS service offering. • Furthermore, individuals often already use the Google environment (Gmail, Drive, Google Docs, etc.) in their personal environment.	• Positioning adopted by the IT department as a follower and not innovator in terms of IS. An analysis of existing tools and ERP on the market had been carried out but without convincing results. The goal is to find the best solution among the software editors at minimal cost. • Google's reputation and the fact that it is an environment known to users contributed to Valeo's choice. Moreover, the Valeo GOISD and IT department consider that Google applications have reached a sufficient stage of maturity. They also view Google as an innovative company.
Enactment and Sensemaking	• Use of the term "Strategy 2.0" internally in order to signify the importance of the new IS. Provision of a wide range of tools in a less top-down logic of openness, according to comments gathered in the IT department and from consultants. Close proximity of the Valeo IT department and top management and influence in the selection of hardware and software solutions. • Development by MNM Consulting of a functional directory application that represents all possible forms of governance. • Functionalities "2.0" added to the management IS of Valeo entities (VRM). • In the 2.0 Pilot Project the stated objective was that the tool be "a collective tool for individual motivation."	• Use of the term "Strategy 2.0" in the company serves to underscore the importance of this IT strategy, which should accompany organizational change. External references have also been taken into account in communication. • Valeo relies on collaborative tools and logic of "self service" in order to change its organization, which is still perceived as too decompartmentalized with entities having a lot of autonomy. The aim is to ensure that the collaborative tools provided to the business departments by the IT department lessen the perception of the "top down" culture. • One of the objectives is also to develop an internal IS perceived less as a reporting tool and more as a collective management tool.

Table 3. Analysis of primary and secondary data from the theoretical analysis grid

4. A PROPOSAL FOR A TYPOLOGY OF INFORMATION SYSTEMS

As we have seen, the evolution and the diversity of uses for IS is an established fact and it calls into question the relationship of the IT department with IS. To understand this issue, and to facilitate the reader's understanding, a typology seems to be the right way to compare these different configurations. Typologies are both a tool and a possible product of comprehensive research (Dumez, 2013): they embody parsimonious conceptual frameworks for describing complex forms (Guillemette and Paré, 2011). Typologies are a well-established analytic tool in the social sciences (Collier *et al.*, 2012) and contribute to diverse analytic tasks: forming and refining concepts, drawing out underlying dimensions, creating categories for classification and measurement, and sorting cases. Although typologies are often seen as purely descriptive, they provide a relevant grid for the study of relationships and even the specification of hypotheses concerning these relationships (Bailey, 1994). Our typology has been constructed on the basis of the models identified in our two representative case studies, Elman's (2005) methodology, and our theoretical analysis grid based on our theoretical framework (Barley, 1986; Orlikowski, 1992; Orlikowski and Iacono, 2001).

4.1. Methodology of the construction of the typology

Various typologies have been proposed, especially in the academic-pro-

fessional literature (Carter *et al.*, 2011; Kettinger *et al.*, 2011; Peppard *et al.*, 2011; Weill and Woerner, 2013), but also in the academic literature (Guillemette and Paré, 2011, 2012; Barlette, 2014). These studies are, however, focused not on the possible relationships between IS applications and their stakeholders (including the IT department), but on the role of the IT department in the organization (Carter *et al.*, 2011; Guillemette and Paré, 2011, 2012; Kettinger *et al.*, 2011; Peppard *et al.*, 2011), the activities carried out by the IT department (Weill and Woerner, 2013), profiles of IS managers (Leidner and Mackay 2007; Preston *et al.*, 2008) and the types of activities carried out by teams in IT departments (Peppard 2003; Ross *et al.*, 2006). Few studies have focused on the nature of the relationships between the IT department as an entity with the other actors.

We wish here to specifically consider not only the role of the IT department or its activities, but especially the relationship between the IS applications and three stakeholders identified in the first section.

- The IT department, with its variable geometry role and power;
- Business departments, i.e. all organizational entities that use IS to implement their business processes, regardless of the hierarchical level of these entities (division, department, team, etc.), to which end-users are linked;
- Software providers, i.e. the editors of software solutions supporting IS, which are usually external to the company (e.g. Google, Salesforce, SAP, Oracle, specialized

start-ups, etc.) but can also be an internal development department.

From our theoretical framework and two case studies, we sought to identify possible relational modalities between the different stakeholders. We also presented our typology of a CIGREF thematic workshop in December 2014 on the new roles of the IS function, with a dozen professional participants from IT units. This event allowed us to test the relational modalities and combinations

established. We identified several possible types of relationships between these entities, which are summarized in Table 4 below (also shown in graphic form in Figures 1 to 4 for each type of relationship). Depending on the variables considered, these relationships may be either between the stakeholders and the IS concerned (co-design and interactional logic, sensemaking and enactment) or between the stakeholders themselves (influence).

<i>Variables of the theoretical framework</i>	<i>Types of relational modalities</i>	<i>Description</i>	<i>Graphic representation</i>
Co-design and interactional logic	A specifies the IS (PO)	Entity A determines the functionalities and expected technical properties of an IT service as PO ³	-----→
	A specifies the IS (PM)	Entity A determines the functionalities and expected technical properties of an IT service as PM ⁴	
	A develops the IS	Entity A develops the software supporting an IT service	
	A operates the IS	Entity A is responsible for the proper functioning of IT resources supporting an IT service (servers, network, software, etc.)	
Influence	A influences B	Entity A influences another entity by its semantics and discourse	————→
Sensemaking and enactment	A enacts the IS	Entity A uses an IT service to implement the business activities of its perimeter	→
	A finances the IS ⁵	Entity A funds the deployment of an IT service and its operation on a given perimeter	

Table 4. Relational modalities

³ Project Owner, i.e. the entity that initiates a project, finances it and benefits from its outputs.

⁴ Project Manager, i.e. the entity that plans, organizes and monitors the success of the project.

⁵ This variable is somewhat specific, but comes from the two case studies, which highlighted the importance of the financial dimension for the business departments in their capacity to choose their tool, since the budget is often a corollary of the power of entities (decision power), and of the capacity to appropriate the tools. But for them to be funded, there must be a decision, and in this sense, we join the “organizing” logic, including several dimensions in the work of Weick and other authors in the field of management (Steyer and Laroche, 2012). The financing link in our schema also reflects the role of the hierarchy (cf. the growing autonomy of business departments emphasized in our paper) and symbolic status (Weick, 1990).

To construct a classificatory typology, we first focus on co-design variables and interactionist logic as well as sensemaking and enactment (the influence variable, less susceptible to systematic analysis, was analyzed solely in the selected configurations). The intersection between the actors and the types of relational modalities gives us a table consisting of 6 rows and 3 columns, allowing us to represent the relationship between the IS and its stakeholders. This table provides an analysis grid for the different possible organizational models of relations between an IT service and its stakeholders. For example, the “Schoolbox Intranet” IS, in the first case previously studied (the higher education institution), can be summarized by Table 5 (more examples from the case studies are provided in annex A).

With 3 actors and 6 possible relationships to the IT service, the number of possible configurations is 3^6 or 729. Since this number of combinations cannot be analyzed exhaustively, compression methods, as defined by Elman (2005) drawing on the work of Lazarsfeld (1965), were implemented. We first conducted a logical compression

(i.e. elimination of impossible or highly improbable cases), based on the following assumptions:

1. The IT service is necessarily developed by the editors (with the possibility that the editor role is played by a dedicated department of the company);
2. The IT service is necessarily enacted by business department users;
3. The IT service is necessarily financed by the IT department or by the business departments.

These three assumptions allow us to reduce the number of cases to $3^3 \times 2$, or 54 possibilities. These 54 cases were then examined within an empirical compression perspective, defined by Elman as the elimination of cases that are theoretically possible but are less relevant empirically or very similar to other cases. This procedure enabled us to eliminate non-existent or insignificant cases (minor variation). For example, cases where a software provider specifies the IS in the role of project owner and where the specification in the role of project manager is made either by a business department or by

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS		X	
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS		X	

Table 5. Example the Schoolbox intranet in the first case studied

the IT department are not empirically relevant. In this example 12 possible cases are thus eliminated ($2 \times 3 \times 2$). Similarly, the 18 cases where the IT service is operated by a business department were not considered significant. This empirical compression was based on our experiments with a number of customers of a major telecommunications provider, our previous research and the two case studies presented above (cf. annex A). With this operation, we were able to distinguish the three most representative models that cover different modalities regarding the roles and positioning of the IT department. We named these three models **IS as a product**, **IS as a service** and **IS as access**, classified in order of emergence. As the reader will see in the annex A, each example from the case study refers to one of these models. Two examples present some minor (i.e. on only one parameter) variations. In an empirical compression perspective,

these variations do not justify a dedicated model in the typology. These three models were then enriched by the relationships of influence between the actors. Note that these three models cut across the current concerns of IT department, as formulated for example in December 2012 by a working group of IS actors from large French companies⁶.

4.2. Presentation of the typology

4.2.1. Model 1: IS as a product

The first model to be considered is where the IS application is entirely managed by the IT department. This model was dominant until the 1990s and is still widely used in organizations. The IT department is responsible for financing, designing and operating the IS, which is then used by those working in business departments. In its role as designer, the IT department se-

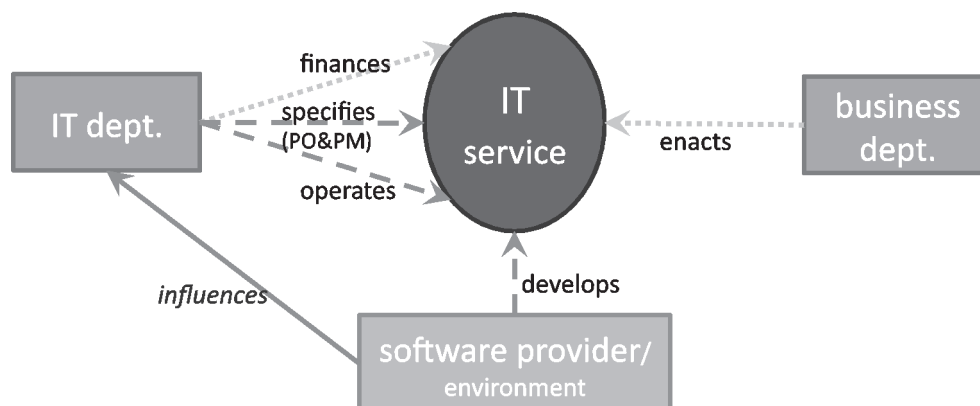


Figure 1. IS as a product

⁶ "Within the company, control of the Information System is no longer solely the prerogative of the IT department. Business departments are no longer obliged to work with the IT department in the same way. Indeed, they can now come up with their own solutions, calling on the IT department only for certain layers of infrastructure, or can continue operating with it in project mode" (CIGREF, 2012).

lects one or more editors to provide the software tools required for its construction, typically an ERP editor, which then has a customer/supplier contractual relationship with the IT department. In some cases, this editor might be a department from the company. This configuration positions the IT department as a supporting entity of the hardware infrastructure and of applications for the smooth running of business departments.

This historically dominant model is still recurrent in recent projects. In this model, the IT department bears all risks associated with the implementation of the IS application: costs and cost overruns, delays, functionalities not matching needs, operational failures, etc. The IT department will therefore seek to gather all the needs of the various business departments in order to construct a median solution among these needs that can thus be shared between the different departments, and in order also to share risks and costs. Indeed the IT department is necessarily seen as a cost unit in this model. The participation of users here proves tricky for the organization, in that they are linked to business departments rather than to the IT department.

With the current diffusion of cloud computing, this model leads to favoring the IaaS (Infrastructure as a Service) mode, which allows the IT department to use virtual servers hosted and maintained by a cloud provider rather than to deploy and operate its own systems. The specific configuration requirements of the software selected, along with security concerns specific to the IT department, will usu-

ally preclude the use of SaaS. Applications with strong real-time constraints will require fine adjustments in terms of the underlying physical entities (physical server, network card, Ethernet switch, etc.). This situation entails that these physical entities be company dedicated, and that there is therefore a specific cloud service (i.e. private cloud).

From the standpoint of business departments, this model implies that they first express their needs to the IT department, then rely on it for the choice and implementation of a solution. They may thus need to take into account the time needed for consultation with other departments, then the selection of the software provider and the implementation of the solution (all of which may require at least a year) as a “tunnel effect”, during which their IS needs are not satisfied. The wish of business departments to gain control over their IS applications combined with the fact that of the IT department to no longer function as a cost unit has led to the development of new modes of operation.

4.2.2. Model 2: IS as a service

The second model was developed from the late 1990s, when business departments gradually gained autonomy in managing their IT budget. Financing of IS became the direct responsibility of business departments, which as project owners also began managing IS design. Project management was delegated to the IT department, which alone has the necessary skills (architecture, technical expertise, etc.) to successfully carry out the project. As in

the previous model, the IT department relies on editors (possibly internal) for the provision of the necessary software tools, through a customer/supplier contractual relationship. Upon completion of development, operation of the IS then remains the prerogative of the IT department, since only it possesses the skills and professional processes needed for these tasks. In this model, the IT department therefore retains a central position.

In this model, the risks are shared between the IT department and business departments. Decisions on costs, time and functionalities are negotiated between them and any disputes arbitrated among the project's stakeholder entities. Beyond an outsourcing role, the IT department here has a crucial advisory role: helping business departments to express and clarify their needs, in order then to choose with them the most appropriate solution. Since funding now comes from business departments, the IT department is no longer solely a cost unit, but is a service center for the business depart-

ments. Although working on the specific needs of each business department, the IT department nevertheless retains an overview of IS applications in the different departments, enabling on the one hand governance of IS as a whole (e.g. master plan, etc.) and on the other the possible establishment of gateways and interoperability mechanisms between the solutions implemented for the various business departments. There is a greater inclusion of users in this case, through the influence of the business departments to which they are attached. With cloud computing, an IaaS mode will be favored as before. Whether the IS software chosen is executed by IT servers located on the company's premises or by virtual IaaS servers, the software needs to be installed, connected to the network, operated and maintained. Doing so remains the prerogative of the IT department, which is responsible only for the contractual and technical connection to the cloud service provider. The IT department will also be called upon to develop technical infrastructure to connect its network to

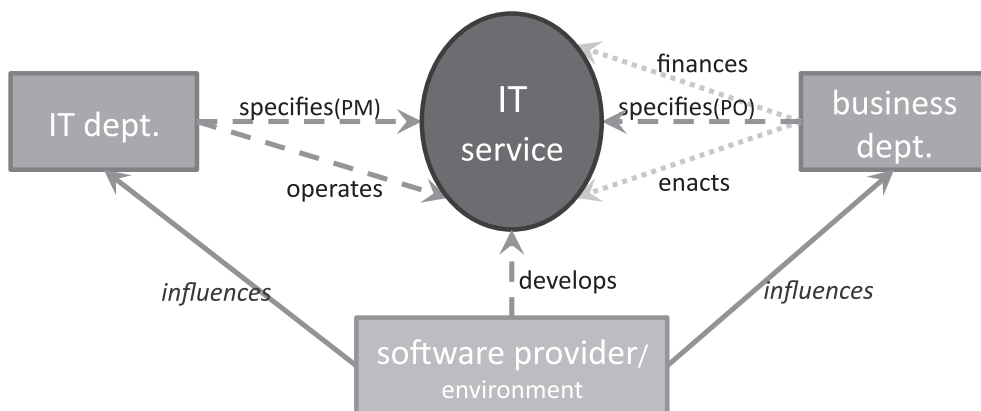


Figure 2. IS as a service

the provider (e.g. IP VPN - Virtual Private Network) and thus capitalize on its role of selecting and operating network services.

For the business departments, this model offers a better execution speed than the previous model (since the pooling of needs between business departments is not a prerequisite), but to meet an IS need requires the establishment of a formalized project, with all the associated organizational ponderousness (projects pertaining to business departments and the IT department, steering committee, etc.). In addition, the IT department, as a service center position for all the business departments and as a point of centralization for various requests, has to prioritize these requests if it is to bring them within its workload, since its capacity for studies and deployment is limited. This necessity can lead to delays when the IT department is overloaded. Depending on the configuration, it can also lead to an increase in its bargaining power in relation to the business departments. From the standpoint of the business departments, this factor may militate in favor of a third model.

4.2.3. Model 3: IS as access

The third model is made possible by the development of SaaS and online services. The provision of a service through software can now be dissociated from its installation, its hosting on IT resources, and the exploitation of these resources (Tiers *et al.*, 2014). Web players (like Google, Salesforce, etc.) provide IS applications online, hosted either by themselves or in

generic data centers in IaaS form (usually operated by specialized companies like Amazon). The expertise of IT departments is no longer essential for the provision of IT services, insofar as they can be supplied by third-party editors (generally actors from the world of the Internet rather than historical actors). A business department, or even a project team (group) or individual, is thus able to use an online service to meet its IS needs – depending on its level of autonomy, its role in the organization, etc. When the department or project also has financial autonomy, it can subscribe to a premium service, but end-users or managers of business departments often prefer the services available at lower cost. In any case, a contractual relationship is established with the service provider (if only by acceptance of the terms of use). In theory, the business department or user selects the service most suited to its specific needs and business processes. In practice, the influence of the environment, namely the discourse of software providers (and especially the major Web players), is crucial, as well as that of colleagues and the personal sphere.

Since these services are accessible via the universal Internet network, the only resource operated here by the IT department is the network, required to access these services. Indeed, the operation of the company's internal network remains under the control of the IT department. Controlling access to the Internet is then the final way the IT department has of exercising control over the tools used (at least on the company premises, because in a travel, nomadic or teleworking situation,

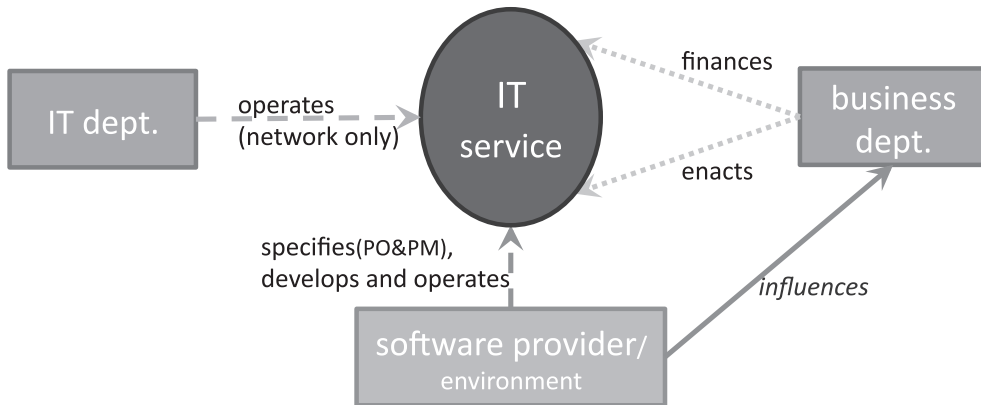


Figure 3. IS as access

employees may well use a network access not controlled by the IT department). This control may be implemented on a basis of opt-out (all sites authorized except those explicitly prohibited) or opt-in (prohibition of all sites except those explicitly allowed). This second position, however, becomes difficult for the IT department to maintain, because it may be viewed as hindering the activity of the business departments, which is increasingly conducted through the Internet (e.g., business intelligence, access to databases, etc.). Similarly, the blocking by the IT department (at network level) of an online IS application purchased by a business department could lead to a situation of arbitration by top management, whose favorable outcome for IT department would be very uncertain.

This model is based exclusively on the use of SaaS cloud computing, which allows business departments subscribing to the service to offload all installation and operating procedures made by the IT department in previous models. SaaS service providers pool

their servers between different client companies. They may, if necessary, configure the underlying physical entities according to the needs of their department (for example, in the case of a department with strong real-time constraints). This configuration is then shared by all their customers. The risks here are fully borne by the business department, which selects only the solution it wants to meet its IS needs. Users can have a strong influence here, since a business department may select a product and test it on a small panel of users, before deciding whether or not to deploy it – SaaS giving great implementation flexibility. Faced with this risk of circumvention, the IT department may be placed in a position of providing consultancy to business departments on the best external applications to use in SaaS form. It thus capitalizes on its skills for understanding and explaining the needs of business departments – as, for example, implemented in the IS as a Product and IS as a Service models. Its role then becomes comparable to that of a consulting firm.

5. DISCUSSION OF THE TYPOLOGY

5.1. Comparative analysis of models of the IT department

It is important to emphasize that these models are not sequential: nothing forces a company to necessarily start by deploying its applications according to the first model, and then the second, before finally adopting the third. It is quite possible for an existing company to begin deploying some IT services on the basis of IS as access

(the third model) before re-internalizing them for strategic reasons by switching to IS as a product (first model) or IS as a service (second model). Our two case studies show IT departments can change from one model to another (the case of the higher education institution), or even mix models (Valeo). Thus, no model is inherently better than others, and the relevance of each model depends on its capacity to meet the strategic needs of the organization, in accordance with theories of IS alignment (Henderson and Venkatraman, 1993; Reich and Benbasat, 2000).

	<i>IS as a product</i>	<i>IS as a service</i>	<i>IS as access</i>
Associated cloud-computing technology	IaaS	IaaS	SaaS
Interactionist logic and co-design	Low level of co-construction. The IS is prescribed by the IT department within a highly normative logic.	Medium level co-construction. The IS is managed (as project owner) by business departments, with little or no involvement of end users.	High level of co-construction. IS needs are equipped directly by the actors responsible for these needs (business departments, working groups, users, etc.), but without IT department control.
Influence of the environment and the personal sphere	Low level of direct influence. Only the IT department has a formal relationship with external actors. The personal sphere can have an impact on the perceived satisfaction of actors.	Medium level of influence. IT department choices are challenged by business departments depending on the discourses carried by the environment.	Strong influence. Business departments and users are directly influenced by the marketing strategies of editors without necessarily measuring the impact of their choices.
Sensemaking and enactment	Logic of prescription of sense by the IT department in accordance with the applications design philosophy.	Logic of co-construction of sense between the IT department and the business departments.	Logic of prescription of sense by editors (externalization of sense), with each group in the company reconstructing its own uses (consumerization movement).

Table 6. Comparison of the models of the typology

Several models coexist in companies, depending on the applications concerned. A company using multiple IS applications is likely not to have constructed all its applications following the same model, depending on its history and strategic decisions, as well as the criticality level the IS application concerned. The third model, IS as access, can thus be viewed as less suitable for sensitive services or those requiring a high level of security and reliability. This question of the level of maturity of companies for adopting such a model is discussed in particular by Tiers *et al.* (2014). For each business unit, a compromise between agility (which will favor the third model, IS as access) and capitalization (which will favor the first or second models, IS as a product or IS as a service) will be reached depending on their respective underlying IS needs. These issues led us to consider a fourth model that, by providing a common integrating framework, is better able to address the relationship between agility and capitalization.

5.2. Towards a fourth model?

IS as a platform

The levers of adoption of Google solutions for Valeo led us to consider a fourth model. At Valeo we saw the emergence of a system based on the multitude of applications offered by Google. Indeed some analysts foresee a number of pitfalls associated with the model described above, IS as access, especially the difficulty for business departments to manage contracts with service editors and to take legal responsibility for them, as well as the

fragmentation caused by the disorderly use of IS applications in SaaS mode. In this context, it seems appropriate to propose a last model, which, as yet, has not been fully identified in companies, but would allow the IT department to maintain its role as guarantor of the integrity of IS, not only from technical standpoint but also from a business and legal standpoint. This final model is based on the separation of IT services into two parts:

- A core, i.e. software providing basic functions and serving as a platform for the provision of more complex services or those targeted on particularly businesses or processes (apps);
- Apps, i.e. specialized services, chosen by business departments.

Both parts can be run on servers hosted in the company, or virtualized servers in IaaS mode. An undertaking in SaaS, however, allows “core” suppliers to capitalize on all deployments and reach a critical mass (a large number of potential users attracts apps suppliers to invest in their ecosystem, and conversely, a large number of apps gives more value to the core). SaaS also facilitates subscription to apps for business departments or users, with the IT department maintaining the contractual relationship with the “core” provider. This model is now widely used independently of IS, by Internet actors. The core is usually developed by a large actor who has been able to integrate an ecosystem around it. The apps are usually developed by smaller, more agile players, often with specific expertise in one type of functionality or task (Wisembly in meeting and con-

ference call tools, Tilkee for commercial prospecting, Fresco for project management, etc.). The iPhone is an example of this core/apps model. Apple provides the core and third-party developers provide apps allowing each user to customize the core as needed. Facebook is another example: its core is the platform enabling users to post and share content with their contacts. The apps are the numerous services provided by third parties, allowing users variously to play games, listen to music, etc., by taking advantages of the underlying social functionalities (viral effect).

The IT department here retains its operational role regarding the corporate network. This role may even be extended in this model through preferential secure links with key SaaS vendors, for example by setting up an IP VPN with these suppliers. The IT department can take advantage of this model by creating a “two-sided market” (Rochet and Tirole, 2003; 2006), even within the boundaries of the or-

ganization, thereby benefiting from cross-network externalities and maximizing value for each of actors (Grover and Kohli, 2012). The IT department thus evolves in its positioning and gradually becomes a fully-fledged economic player in the organization, halfway between a host and a content provider, acting as manager of a platform creating not only value, but also sense, depending on the providers selected. Its importance in the organization increases, since it increasingly contributes to the creation of value through the provision of applications that can create or strengthen the competitive advantage of business departments, within a multi-criteria logic: not only responding quickly and effectively to a business need, but ensuring performance, flexibility, security, etc. as well as the management of contracts and possible legal uncertainties.

Unlike the previous models, this model has not yet been significantly deployed in practice, but is nevertheless found in professional discourse

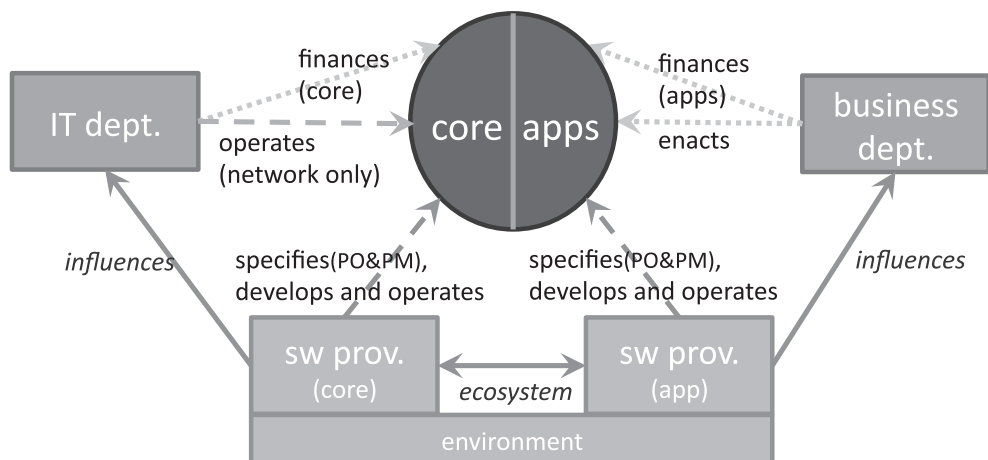


Figure 4. IS as a platform

and its beginnings can be observed in our case study of Valeo. It seems important to follow how this model develops in future, since it probably represents the last opportunity for the IT department to retain control over the new IS applications, while offering each business department the possibility of adapting to its needs within a logic of bricolage (Ciborra, 1996), so as to take into account the dynamicity of these needs and their sometimes fast evolution. Doing so will also help avoid the tunnel effect stemming from an application implementation controlled by the IT department (which necessarily seeks to pool needs between the company's different business departments to the detriment of taking into account urgent matters and specificities), in favor of the provision of specialized apps for specific needs.

CONCLUSION

The detailed study of the dynamic interactions between structuring tools, renewal practices and the construction of organizational interdependencies is a major ongoing focus of research on organizational transformation (Besson and Rowe, 2011; Pascal, 2012). In this article, we offer an original typology at a theoretical level, complementary to existing typologies, of the relationship between IT services and stakeholder entities in the organization, by focusing on the relational modalities between actors: the IT department, the business departments, software editors and online service providers. Four models have been identified from the typology: IS as a product, IS as a service, IS as access and IS as a platform.

These four models combine with different ways of cloud computing technology. IaaS will be favored for the first two, and SaaS for the last two. At a managerial level, our research thus provides an incentive for IT and business departments to select the model of an IT service to be conceived prior to the choice of cloud computing technologies. The explicit choice of a configuration will enable actors to share a common representation and to guide the technology choices stemming from it (e.g. IaaS vs. SaaS). Guillemette and Paré (2012) have emphasized how typologies are powerful tools for structuring the thinking of IT departments with regards to the profile of their function. In line with this work, our research enables IT departments to project themselves into specific organizational models, thereby gaining insight into which types of relationship with the business entities to favor. Often regarded as a "support" service, the IT department could take advantage of changes in usage and of the ever increasing constraints on business departments to reposition itself as a service participating in the creation of value and thus developing the appropriate skills and relational modalities (negotiation with editors, integration capacity, advanced knowledge of business processes, etc.). Various studies have already pointed out that the IS strategy can help develop a company's business departments (Agarwal and Sambamurthy, 2002; Chen *et al.*, 2010).

Moreover, this has implications for the place of the IT department in the organizational chart, its reporting lines and the skills of its staff in the era of cloud computing. In addition to the

technological expertise necessary for innovations in IS, the IT department must acquire a capacity for analysis and understanding of the needs of business departments in operational terms. The logic of co-design of IS with business departments further upstream is one way to overcome this problem, especially for participating in the creation of a shared sense (Weick, 1990; 1995) and of a language intelligible to all actors (Swanson and Ramiller, 1997). The transversality of information systems has made IT departments generalists with a broad view of the company, that allows them to play both the role of guardian of the integrity of all IS and, through their knowledge of action levers, a driving and proposal role (Giandou, 2010). The embedding of IS and management tools could indeed alter the role of the IT department, making it increasingly an “architect of the organization” in addition to being responsible for the urbanization of IS. However, one of the technological and contractual challenges for IT departments is still to ensure a minimum level of interoperability between applications, including cloud computing (Marston *et al.*, 2011).

In terms of methodology, our research suffers from a lack of between-case analysis, which it would be advisable to implement to deepen each configuration of the typology. Moreover, even though typology is a valuable analytical tool increasingly used in qualitative research, it should be viewed with caution because of its static character as “a snapshot in time”. Several lines of research therefore emerge. Each model needs to be com-

pared more specifically with a number of in-depth case studies, particularly in terms of positioning issues for the IT department, and their relationship to the objectives and strategy of the organization explained. The possibilities for relational modalities could also be developed by taking into account the research of Giddens (1979, 1984), which shows that information systems embody interpretive schemes (structures of signification), provide opportunities for control and coordination (structures of domination), and cover norms (structures of legitimation). A final line of research would be to work on more precise identification of the skills of IT departments and their profile, in view of the organizational models in which they are situated, in conjunction with typologies already produced and mentioned in our research. It is likely that each organizational model requires standard profiles in terms of IT departments.

BIBLIOGRAPHY

- Agarwal, R., Sambamurthy, V. (2002), “Principles and Models for Organizing the IT Function”, *MIS Quarterly Executive* Vol. 1, n°1, p. 1-16.
- Armbrust, M., Fox, A., Griffith, R. (2009), “Above the Clouds: A Berkeley View of Cloud Computing”, *Science*, n° 53, p. 7-13.
- Azan, W., Beldi, A. (2010), “De la cybernétique à la théorie de la human agency : vers un management des SI centré sur les utilisateurs”, *Management et Avenir*, Vol. 9, n° 39, p. 192-212.
- Barlette, Y. (2014), “L'évolution du rôle du DSI: état de l'art et identification de pistes de recherche”, *AIM symposium*.

- Barley, S.R. (1986), "Technology as an occasion for structuring: Evidence from observations of CT scanners and the social order of radiology departments", *Administrative Science Quarterly*, Vol. 31, n°1, p. 78-108.
- Bailey, K.D. (1994), *Typologies and taxonomies: An introduction to classification techniques*, Sage Publications.
- Baskerville, R. (2011), "Individual information systems as a research arena", *European Journal of Information Systems*, Vol. 20, n°3, p. 251-254.
- Besson, P., Rowe, F. (2011), "Perspectives sur le phénomène de la transformation organisationnelle", *Systèmes d'Information et Management*, Vol. 16, n° 1, p. 3-34.
- Bhattacharjee, A., Park, S.C. (2013), "Why end-users move to the cloud: a migration-theoretic analysis", *European Journal of Information Systems*, Vol. 23, n°3, p. 1-16.
- Boucher, E. (2009), "Software as a Service, quelle est la maturité de ce marché et les possibilités d'utilisation par les entreprises", *Thesis in Management of Information Systems and Technology*, HEC Paris.
- Carter, M., Grover, V. and Thatcher, J.B. (2011), "The Emerging CIO Role of Business Technology Strategist", *MIS Quarterly Executive*, Vol. 10, n° 4, p. 19-29.
- Chen, D.Q., Mocker, M., Preston, D.S. and Teubner, A. (2010), "Information systems strategy: Reconceptualization, measurement, and implications", *MIS Quarterly*, Vol. 34, n° 2, p. 233-259.
- Ciborra, C. (1996), "The Platform Organization: Recombining Strategies, Structures, and Surprises", *Organization Science*, Vol. 7, n° 2, p. 103-118.
- CIGREF (2012), *Politique d'Infrastructure de l'Entreprise Numérique*, report available online <http://images.cigref.fr/Publication/2012-Politique-Infrastructure-Entreprise-numerique.pdf>.
- CIGREF (2014), *Les nouveaux rôles de la fonction SI*, report available online <http://images.cigref.fr/Publication/2013-2014-Nouveaux-roles-de-la-Fonction-SI-Missions-Competences-Marketing-de-la-fonction-SI-CIGREF.pdf>.
- Collier, D., LaPorte, J. et Seawright, J. (2012), "Putting Typologies to Work: Concept Formation, Measurement, and Analytic Rigor", *Political Research Quarterly*, Vol. 65, n°1, p. 217-232.
- Davis, F.D. (1989), "Perceived usefulness, perceived ease of use, and user acceptance of information technology", *MIS Quarterly*, Vol. 13, n° 3, p. 319-339.
- Davis, G.B. (2000), "Information Systems Conceptual Foundations: Looking Backward and Forward," in *Organizational and Social Perspectives on Information Technology*, R. Baskerville, J. Stage, and J. I. DeGross (eds.), Boston: Springer, p. 61-82.
- DeLone, W.H., McLean, E.R. (2003), "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update", *Journal of Management Information Systems*, Vol.19, n° 4, p. 9-30.
- Denervaud, I., Bouferrache, D., Thiollot, A-M. and Vallejo, J-L. (2012), "Les nouveaux usages bousculent les stratégies IT", *l'Expansion Management Review*, n° 145, p. 92-101.
- Desanctis, G., Poole, M.S. (1994), "Capturing the complexity in advanced technology use: Adaptive structuration theory", *Organization science*, Vol. 5, n° 2, p. 121-146.
- Dhar, S. (2012), "From outsourcing to cloud computing: Evolution of IT services", *Management Research Review*, Vol. 35, n° 8, p. 664-675.

- Doty, H.D., Glick, W.H. (1994), "Typologies as a Unique Form of Theory Building: Toward Improved Understanding and Modeling", *Academy of Management Review*, Vol. 19, n° 2, p. 230-251.
- Dougherty, D. (2002), "Grounded Theory Research Methods", in J. A. C. Baum (Ed.), *Companion to Organizations*, Oxford: Blackwell, p. 849-866.
- Dumez, H. (2013), "Qu'est ce que la recherche qualitative ? Problèmes épistémologiques, méthodologiques et de théorisation", *Gérer et Comprendre*, n° 112, p. 29-42.
- Eisenhardt, K.M. (1989), "Building Theories From Case Study Research", *Academy of Management Review*, Vol. 14, n° 4, p. 532-550.
- Elie-dit-Cosaque, C. (2011), "Les Technologies de l'Information et de la Communication (TIC) et le contenu du travail", *Réalités industrielles*, février, p. 35-39.
- Elman, C. (2005), "Explanatory Typologies in Qualitative Studies of International Politics", *International Organization*, Vol. 59, n°2, p. 293-326.
- Fimbel, E. (2003), "Les facteurs décisionnels de l'externalisation des systèmes d'information: référentiels théoriques, éléments empiriques et proposition typologique", *Systèmes d'Information et Management*, 4(8), p. 31-60.
- Fouquet, M., Carle, G. (2009), "Cloud Computing for the Masses Position Paper", *Proceedings of the 1st ACM workshop on User provided networking challenges and opportunities*, p. 31-36.
- Gens, F. (2014), *Worldwide and Regional Public IT Cloud Services 2014-2018 Forecast*, IDC Corporate USA.
- Giandou, A. (2010), "Les usages des systèmes d'information dans les grandes entreprises", *Entreprise et histoire*, n° 60, p. 170-184.
- Girard, R. (1961), *Mensonge romantique et vérité romanesque*, Grasset, Paris
- Grover, V., Kohli R. (2012), "Cocreating IT Value: New Capabilities and Metrics for Multifirm Environments", *MIS Quarterly*, Vol. 36, n° 1, p. 225-232
- Guesmi, S., Rallet, A., (2012), "Web 2.0 et outils de coordination décentralisée", *Revue Française de Gestion*, n° 224, p. 139-151.
- Guillemette, M.G., Paré, G. (2012), "Toward a New Theory of the Contribution of the IT Function in Organizations", *MIS Quarterly*, Vol. 36, n°2, p. 529-551.
- Guillemette, M.G., Paré, G. (2011), "La dynamique de transformation de la direction des systèmes d'information", *Systèmes d'Information et Management*, Vol. 16, n° 1, p. 35-68.
- Henderson J.C., Venkatraman, N. (1993), "Strategic Alignment: Leveraging Information Technology for Transforming Organizations", *IBM Systems Journal*, Vol. 32, n° 1, p. 4-16.
- Iyer, B., Henderson, J. (2010), "Preparing for the Future: Understanding the Seven Capabilities of Cloud Computing", *MIS Quarterly Executive*, n° 9, n°2, p. 117-131.
- Kettinger, W.J., Zhang, C., and Marchand, D.A. (2011), "CIO and Business Executive Leadership Approaches to Establishing Company-Wide Information Orientation", *MIS Quarterly Executive*, Vol. 10, n° 4, p. 157-174.
- Lacity, M., Willcocks, L. (2013), "Outsourcing business processes for innovation", *MIT Sloan management review*, Vol. 54, n°3, p. 63-69.
- Lamb R., Kling, R. (2003), "Reconceptualizing Users as Social Actors", *MIS Quarterly*, Vol. 27, n° 2, p. 202-217.
- Lazarsfeld, Paul F., and Allen H. Barton (1965), "Qualitative Measurement in the

- Social Sciences: Classification, Typologies, and Indices", in *The Policy Sciences*, edited by Daniel Lerner and Harold D. Lasswell, Stanford University Press.
- Leclercq-Vandelanoitte, A. (2010), "Un regard critique sur l'approche structurationaliste en SI: Une comparaison avec l'approche foucaldienne", *Systèmes d'Information et Management*, Vol. 10, n° 1, p. 35-68.
- Leidner, D.E., Mackay, J.M. (2007), "How Incoming CIOs Transition into Their New Jobs ", *MIS Quarterly Executive*, Vol. 6, n° 1, p. 17-28.
- Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., and Ghalsasi, A. (2011), "Cloud Computing - The business perspective", *Decision Support Systems*, Vol. 51, n°1, p. 176-189.
- Mikkilineni, R., Sarathy, V. (2009), "Cloud Computing and the Lessons from the Past, Enabling Technologies: Infrastructures for Collaborative Enterprises", *18th IEEE International Workshops*, p. 57-62.
- Motahari-Nezhad, H. R., Stephenson, B., and Singhal, S. (2009), "Outsourcing business to cloud computing services: Opportunities and challenges", *IEEE Internet Computing*, Special Issue on Cloud Computing.
- Orlikowski, W.J. (1992), "The Duality of Technology: Rethinking the concept of Technology in Organizations", *Organization Science*, Vol 3, n° 3, p. 398-427.
- Orlikowski, W.J., Iacono, S.C. (2001), "Desperately seeking the "IT" in IT research: A call to theorizing the IT artefact", *Information Systems Research*, Vol. 12, n°2, p. 121-134.
- Pascal, A. (2012), "Le design science dans le domaine des systèmes d'information: mise en débat et perspectives", *Systèmes d'Information et Management*, Vol.17, n° 3, p. 7-31.
- Pavlou, P.A., El Sawy, O.A. (2010), "The "Third Hand": IT-Enabled Competitive Advantage in Turbulence Through Improvisational Capabilities", *Information Systems Research*, Vol. 21, n°3, p. 443-471.
- Peppard, J. (2003), "Managing IT as a Portfolio of Services", *European Management Journal*, Vol.21, n° 4, p. 467-483.
- Peppard, J., Edwards, C. and Lambert, R. (2011), "Clarifying the Ambiguous Role of the CIO", *MIS Quarterly Executive*, Vol. 10, n° 4, p. 31-44.
- Preston, D.S., Leidner, D.E. and Chen, D. (2008), "CIO Leadership Profiles: Implications of Matching CIO Authority and Leadership Capability on IT Impact", *MIS Quarterly Executive*, Vol.7, n° 2, p. 57-69.
- Reich B.H., Benbasat, I. (2000), "Factors that Influence the Social Dimension of Alignment between Business and Information Technology Objectives", *Management Information Systems Quarterly*, Vol. 24, n°1, p. 81-113.
- Reix, R., Rowe, F. (2002), *Faire de la recherche en systèmes d'information*, Vuibert.
- Rivard, S., Aubert, B. (2007), "Information Technology Outsourcing, Advances in Management Information Systems", Vladimir Zwass Series Editor. Rogers, E.M, *Diffusion of innovations*, D. W. Stacks and M. B. Salwen, eds., Free Press.
- Rochet J.C., Tirole, J. (2003), "Platform Competition in Two-Sided Markets", *European Economic Association*, Vol. 1, n° 4, p. 990-1029.
- Rochet, J.C., Tirole, J. (2006), "Two-Sided Market: A Progress Report", *The RAND Journal of Economics*, Vol. 35, n°3, p. 645-667.
- Ross, J. W., Beath, C.M. and Goodhue, D.L. (1996), "Develop Long-Term Com-

- petitiveness through IT Assets", *Sloan Management Review*, Vol. 38, n° 1, p. 31-42.
- Saga, V., Zmud, R. (1996), "Introduction de logiciels de gestion dans des petites entreprises liées à une profession libérale", *Systèmes d'Information et Management*, Vol. 1, n° 1, p. 51-74.
- Steyer, V., Laroche, H. (2012), "L'apport des théories du sensemaking à la compréhension des risques et des crises", *Les cahiers de la sécurité industrielles*, mai.
- Sultan, N. (2011), "Reaching for the "cloud": How SMEs can manage", *International Journal of Information Management*, Vol. 31, n°3, p. 272-278.
- Swanson, E.B., Ramiller, N.C. (1997), "The organizing vision in information systems innovation", *Organization Science*, Vol. 8, n°5, p. 458-474.
- Tiers, G., Mourmant, G., Leclercq-Vandelannoitte, A. (2014), "L'envol vers le cloud: un phénomène de maturations multiples", *Systèmes d'Information et Management*, Vol. 18, n°4, p. 7-42.
- Venkatesh, V., Morris, M., Davis, G.D. and Davis F.D. (2003), "User acceptance of information Technology: Toward a unified View", *MIS Quarterly*, Vol. 27, n°3, p. 425-478.
- Weick, K.E. (1990), "Technology as equiv-
oque: Sensemaking in new technologies", in P.S. Goodman et al. (eds), *Technology and Organizations*, Publishers.
- Weick, K.E. (1995), *Sensemaking in organization*, Sage Publication.
- Weick, K.E. (2000), *Making sense of the organization*, Blackwell Publishers.
- Weill, P., Woerner, S.I. (2013), "The Future of the CIO in a Digital Economy", *MIS Quarterly Executive*, Vol. 12, n° 2, p. 65-75.
- Yin, R.K. (2003), *Case Study Research: Design and Methods*, 3rd edition, Thousand Oaks, CA: Sage.
- Zammuto, R.F., Griffith, T.L., Majchrzak, A., Dougherty, D.J. and Faraj, S. (2007), "IT and the changing fabric of the organization", *Organization Science*, Vol. 18, n° 5, p. 749-762.

APPENDIX A: SOME EXAMPLES OF RELATIONS BETWEEN AN IT SERVICE AND ITS STAKEHOLDERS IN THE TWO CASE STUDIES

Case 1 – previous Business ERP (Auriwin) → IS as a product

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS	X		
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS	X		

Case 1 – new Business ERP (E-Charlemagne – Konosys) → IS as a product

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS	X		
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS	X		

Case 1 – Schoolbox intranet → IS as a service

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS		X	
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS		X	

Case 1 – Cegedim HRIS → IS as an access

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS			X
specifies (PM) the IS			X
develops the IS			X
operates the IS			X
enacts the IS		X	
finances the IS		X	

Case 1 – Notilus → IS as an access

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS			X
specifies (PM) the IS			X
develops the IS			X
operates the IS			X
enacts the IS		X	
finances the IS		X	

Case 1 – LimeSurvey → IS as an access

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS			X
specifies (PM) the IS			X
develops the IS			X
operates the IS			X
enacts the IS		X	
finances the IS		X	

Case 1 – Office 365 → IS as a product

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS	X		
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS	X		

Case 1 – Hivebrite → IS as an access (minor variation: PO role played by the business department for the customization of the product into a dedicated instance)

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS		X	
specifies (PM) the IS			X
develops the IS			X
operates the IS			X
enacts the IS		X	
finances the IS		X	

Case 2 – previous solution (IBM Lotus Notes) → IS as a product

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS	X		
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS	X		

Case 2 – Google Apps → IS as an access (minor variation: financing done by the IT department)

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS			X
specifies (PM) the IS			X
develops the IS			X
operates the IS			X
enacts the IS		X	
finances the IS	X		

Case 2 – Roadmap Manager → IS as a product

<i>Relationships/actors</i>	<i>IT department</i>	<i>Business departments</i>	<i>Software Provider</i>
specifies (PO) the IS	X		
specifies (PM) the IS	X		
develops the IS			X
operates the IS	X		
enacts the IS		X	
finances the IS	X		