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CHANGING SPACES FOR SOCIAL LEARNING IN THE IMPLEMENTATION BIOGRAPHY OF AN ERP SYSTEM: A LONGITUDINAL CASE STUDY

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Abstract

This paper describes the dynamics of IT related expertises as social learning distributed in space. The case of an Italian local government organization using an ERP software designed for the public sector has been analyzed. Data on distinctive locational patterns of organizational resources concerning post-implementation enhancements of the system were gathered through interviews and observations of the system in use. Four different locational patterns of IT related expertise have been identified in the case across different time periods: the 'implementation team' period (1998-2001), the 'era of personalization' (2002-2005), the move from the in-house software enhancement to external consultancy (2005-2008) and the more recent appointment of a different consortium of multiple consultants to implement additional software modules.

Keywords: Social Learning, ERP System, IT Expertise, Locational Patterns, Public Sector

1   INTRODUCTION

Considerable attention has been placed in recent years to the dilemma user organisations can face regarding how much to adapt and enhance the ERP package they have acquired, as this may prejudice maintainability and ability to take on board future enhancements and upgrades (Brady et al., 1992; Fincham et al. 1995). However, the development of inter-operable add-ons developed by third party vendors to cater for specialised requirements not supported by the ERP vendors, changes the parameters for this choice. User organisation transfers to that third party the responsibility for developing the interfaces, and testing the module's compatibility with the ERP system and its upgrades. Furthermore, the connections between implementation choices and issues of post-implementation maintainability underline the need user organizations may have to address the whole package implementation lifecycle with technologies such as ERPs. The career of the package within the implementation arena of its organisational users (the 'project' life cycle) represents only one moment in a bigger picture in the evolution of the technology itself (the 'product' lifecycle), alongside the further development of the software by vendors. These observations point to important processes of social learning that reach beyond the organizational boudaries as an initially generic software suite is appropriated or domesticated in extended periods (Williams, 2005).

In this research paper I attempt to contribute to the development of theoretical approaches focused on long-term social learning processes in the appropriation of ERP systems in the space between supply and use. My case study highlights how implementation choices depend upon the distribution of responsabilities for the realization of the software across diverse intermediary actors in the space between supply and use at different times in an italian public sector organization - let us call it Dante Province.

I draw on and extend contemporary thinking about ERP systems appropriation, and social learning in technological innovation (SLTI) by foregrounding the spatio-temporal aspects involved in knowledge formation about the appropriation and domestication of an ERP system within a particular organizational setting. My aim is to understand the spatio-temporal aspects in knowledge formation about ERP implementation and after-implementation.

I begin by providing some background on the dimensions of the dilemmas related with implementation choices. ERP vendors stress the capacity of their systems to provide best practice solutions for all firms

and the advantages of 'vanilla implementation' of ERP packages (utilising the functionality it incorporates without adaptation). Customisation has been portrayed by vendors and ERP consultants as liable to prejudice the success of ERP, bringing high costs when the system is implemented (Davenport 1998; Liang et al. 2004; Soh et al. 2000). It is striking therefore that the practices of user organisations have diverged sharply from these recommendations. Surveys of ERP implementations in the late 1990s revealed some instances (representing a minority of implementations) in which organisations, having identified gaps between the package and their organisation's ways of doing things, decided to just live with these gaps or re-engineer their business processes to meet the requirements of the package. More frequently (and in the majority of implementations), there was an extensive process of customization and adaptation of the software systems. These adaptations could take various forms: configuring the package (Clausen & Koch, 1999; Pollock & Cornford 2004), customising the package (Davenport 1998; Soh & al., 2000; Brehm & al. 2001; Richmond & al. 2006), partial, selective implementation of package (Davenport 1998; Liang & al., 2004; Clemmons & Simon, 2001), add-ons, bolt-ons or 'extension software' (Kumar & al., 2003, Sprott, 2000) and 'best of breed' multi-vendor systems (Mabert & al., 2001; Light et al. 2001). Furthermore, for the user organisation, the adoption of ERP constitutes a major and long-term investment – one that shapes the user organisation's information systems and practices for extended periods. The benefits of ERPs in terms of organisational performance typically take a long time to accrue. This can be attributed to an extended process of experimentation as the organisation grapples with the affordances of these enormously complex systems for their own purposes. Managerial guidelines for how to achieve successful outcomes from ERP implementation place increasing weight on the post-implementation phase (Somers & Nelson, 2004; Wei & al., 2005). Implementation choices becomes not so much a question of depth of technical expertise but more of identifying interactions between third party participants affecting/intermediating the user/developer relationship in the development, implementation and post-implementation of packaged software at different times. In many cases, the issue is not to reveal available choices and analyse the forces determining which designs are eventually adopted. Instead, the situation is often characterised by an apparent absence of choice, and the problem is to account for this 'absence'. In doing so, attention is focused on the 'real' limiations on choice which are located in the wider social system, and which bear in upon specific contexts in which technical change is taking place. Resolving these calls for extensive, and by implication shallower, knowledge of the enormously wide array of potential interactions between their product and other elements of the broader socio technical infrastructure affecting implementation choices, it creates issues about how such knowledge can be represented and managed in extended periods.

In this paper I respond by proposing a theoretical approach that develops a spatial focus upon social learning processes in ERP implementation and provides insights into the relationship between supply and use for implementation choices concerning ERP systems in extended periods. Theorizing the geographical dimension of social learning in implementation choices is fundamental to identify the distribution of responsabilities for the realization of the ERP software beyond the boundaries of the single organization. Therizing its historical dimension is crucial to understand its changes over time. I author four locational patterns of user/developer relationship identified during my analysis that highlight the relational and historical nature of technical knowledge formation guiding implementation choices. My conclusions suggest that the creation of representations of ERP systems uses and their translation into technological designs and organizational actions depend upon organizational moves taking place in an extended situation, involving constiutencies taking form in the wider inter and intra-organizational design/use interactional space. Furthermore, the creation of representations of ERP implementation and support needs continues throughout multiple generations of product development, where each generation tends to build representations of ERP uses in relation with what has been learned by the previous one.

I suggest that this highlights the need that the scope of ERP projects and their inherent risks challenging IS researchers to inform the work of practitioners have to draw insights from the analysis of historically and geographically extended cases of ERP implementations. Through my spatial analysis I reveal the

distributed (Pentland, 1992) and abductive (Almkov, 2008) nature of technical knowledge formation in organizations. The main theme that I explore centers around the question: what counts as a resources for social learning in ERP implementation? Locational patters I describe during a ten-years ERP project highlight that both the distribution of actors in space and their changes in interactions over time count as a resource for social learning.

My spatial turn within social shaping of technology and social learning provides insight into popular notions such as 'trajectories of development' (Fleck et al., 1990), 'sociotechnical constituency' (Molina, 1989a), not only through a study of ERP in context, but by explicitly examining information systems implementation in extended time-spaces. Understanding the dynamics of development - both in terms of the actors perspectives and of the lessons learnt from the past - will not resolve all complexities and costs of anticipation and intervention, but will go some way to mitigate them.

2   SPACE IN INFORMATION SYSTEM RESEARCH

The Social Learning in Technological Innovation approach addresses in detail the intricacies in the positioning of the variuos intermediaries and intermediation that transform technologies, uses and qualities in both use and development domains, and explicates the bridges and gaps that exist with different locational patterns in the space between design and use (Williams et al., 2005). Space has been a concern in information system research in (1) the network and embeddedness perspective in economic and organizational sociology, and in (2) the actor-network analysis in science studies. Network is the notion established by the organizational literature and by the economic sociology literature to capture the phenomenon that business firms are interacting in complex and cooperative ways throughout geographic distributions (Di Maggio 2001, p.21; Filgstein 1990). However, in network approaches, networks are sparse social structures, and it is difficult to see how they can fully account for what we observe in the course of inter- and intra-organizational relations in terms of intense and dynamic conversational interactions, knowledge flows and temporal structures. Network approaches have been criticized for containing no sense of the specific processes and mechanisms of knowledge transfer and the consequences these may have for technology choices and their societal outcomes (Knorr Cetina and Bruegger, 2002: p. 910). A closer look is needed to capture the interactional means of structuration that are embedded in post-local forms of service sourcing. However, the assumption that have characterized much microsociological thinking in the past - those of the relative autonomy of micro-orders and their confinement to physical setting - are seen as theoretically no longer adequate in a world in which interactions can also be disembedded from local settings, in which space may be separated from place (Giddens 1990, p.18). Places can thus be imagined as 'articulated moments in networks of social relations and understandings' (Massey, 1991, p. 28).

Concerning the actor-network analysis in science studies, STS research in IS and elsewhere has concentrated on the emergence of IT as black boxes (Quattrone and Hopper, 2006). Networks of actor-network theory are networks comprised of diverse materials, woven together in order to ensure durability of the consolidated relations. By developing a critique of studies which are concerned only with social relations, actor network theory argues that such relations count little unless they are held together by durable and resisient materials. As a consequence of this argument, actor-network theory stresses the quality of networks to endure beyond present and remain stable across space. These are networks where translations are perfectly accomplished and stabilized, where the entities are effectively aligned. These networks demarcate 'spaces of prescription' (Latour, 1992). Networks as spaces of prescription helps clarify how IT systems acquire stability and become taken-for-granted but it neglects what happens when they achieve this status. This carries the danger of wrongly assuming that organisational worlds achieve order and stability once processes leading to black boxing are identified (often judged in terms of success or failure). However, in our case we want to illustrate how (here passing regimes) the ERP system changed continually and differently across various spaces and times between design and use, to meet emergent development-in-use and use-in-development demands. In other word, the space demarcated by the network in our case is a 'space of negotiation' where

technology is emerging through a complex interaction between many diverse players (within the organization, in the client-consultant relationship, among different public administrations, among public organizations of different sectors) with their own, often differing, perceptions, commitments and interests. In this "technological ferment" it is very difficult to achieve "closure". These processes not only shape technology, but can have dramatic effects on the structure of the innovating network, the consitution of the organizations involved and the identities of the actors (Hasu, 2001; Russel and Williams, 2002; Hyysalo, 2006).

3   RESEARCH APPROACH

The case of an Italian local government organization using SAP Public Sector has been analyzed. Data on distinctive locational patterns of organizational resources concerning post-implementation enhancements of the SAP system were gathered through interviews and observations of the system in use. In order to access the field, I identified a singular SAP module as a starting point - the Project System module (PS). The idea of selecting a single module as a starting point was to be able to identify SAP system usage across different organizational functions, beyond the Accounting Division (Hislop, 2002; Westrup, 2005). Representatives of each organizational unit concerned with SAP have been interviewed. Providers of technical support on the SAP system have also been identified and interviewed. This opportunity facilitated the fieldwork with the identification of the relevant intermediary actors. Key users and the either internal or external technical support team members have been interviewed. A total of 12 interviews have been performed across a period of 2 years. Interviews concerned the following dimensions:

   i.   organizational processes supported by the SAP system: norms, characteristics of the planning activity; scope of the SAP modules;

   ii.   organizational actors involved in the process supported by SAP: role of the organizational structures involved;

   iii. description of SAP: SAP advantages, critical aspects of SAP personalizations, integration, trasversality;

   iv.   post-implementation technical support on SAP: module introduction, tests, responsibilities, role.

Some aspects of the activities accomplished by the key actors on the system have been also observed. Observations of the system in use have been also performed in order to analyse the nature of the technical solution.

4   RESULTS

The case of ERP post-implementation activities arrangements in the case of Dante Province is described across four different periods, covering the time span of a decade. Each period corresponds to a specific IT-related expertise locational patter. In the first period that I provisionally term the 'Implementation Team' period, the functional analysis expertise, the programming and the accounting competence were found together in the same place within the implementation team. There were no external consultants working in the team. The Dante Province at that time was the first Italian public administration implementing a SAP version for the public sector. A second period, described as the 'era of personalizations', describes the period following the implementation team quit. A product support chain was built including the appointment as key users of internal staff services employees. As mentioned before, internal Staff Services employees were not direct users of the system. Staff Services role was to monitor the coherence and regularity of the data input in the system by the Operative Services. At that time, the IT in-house company started to outsource programming functions to small external consultants able to program the system, while maintaining feasibility and functional analysis

in-house. In the third period, feasibility studies and analyses have been also outsourced to the technology supplier consultant. Other public administrations started to learn how to implement SAP. Consultants started to have experiences on the implementation of that system in the public sector. The fourth period presented concerns the issuing of a Consortium for the implementation of new system modules in the stead of the SAP consultants. Despite Dante Province wanted to continue with the SAP consultants, the in-house IT company decided to empanel a Consortium made by academic partners, other non-SAP consultants and members of the in-house IT company. The decision has been justified by the fact that the Consortium was already in place for other SAP implementation projects in other local public administrations (e.g. the University).

4.1   The implementation team (1998-2001)

It was the 1998 when SAP was first introduced in the Dante Province. SAP italian version of the verticalization for the public sector had just come out the year before. At that time, SAP in the public sector was implemented in Spain and Austria, but there were neither italian public administrations implementing SAP nor consultant knowing how to implement SAP in the italian public sector. A temporary ad-hoc implementation team has been empanelled by Dante Province for the purpose of first introducing SAP. It was formed by a project reference person, internal employees and by members of the in-house company, at that time performing the fasibility study, the functional analysis and the programming of new pieces of software. One of the most relevant aims for introducing SAP in the Dante Province was to decenter accounting services. Accounting services previously performed by a centralized group of 30 accountants were going to be distributed over 400 people. As it was first introduced, the SAP modules were in a standard version that is without customizations:

"Each single user, each single unit was responsible for the data input and for the controls. We structured the system in a way that would have solved the information requirements of the Staff units, in order for them to be able to monitor. But essentially, the system was intended to serve the Operative services users (Dante Province ERP Project manager).

The modules served the management of 14 long-terms plans, each corresponding to a relevant organizational Unit. Organizational Units in the Trento Province are divided in Staff Services and Line Services. Staff Services are organizational units that provide services to other internal units. Line Services are organizational units that provide services to other parties (citizens, firms, etc...). Long-term plans have to be filled only by Line Services, while Staff services like the Planning and the Accounting Services just consult them as reports. The idea, in the implementation period, was that SAP should have served to manage the common data, while the sector-specific data should have been left with other applications, autonomously choosen by the Line Services. This would have avoided duplications of data and should have induced a clearer overall vision of the SAP functionalities: "Let's say that the structural data, the sectorial data, should not be inputted in SAP, because it is useless to input in SAP information that does not have an added value for all. One must say: 'ok, the data in SAP are the official data'. From there, beneath, or as a complement, one has her excel table where the source data and the sectorial data are identified. In this way there is no duplication" (SAP project reference person).

4.2   The era of personalizations (2002-2005)

Lately, this team has been dissolved. The SAP project reference person has been moved from the IT Division to the Accounting Division. In addition, the programming tasks (e.g. writing with ABAP code) have been outsourced by the in-house company to small external consulting companies. In the stead of the expertise found together in the ad-hoc implementation team, a process where Staff Service Planning and Accounting key users were in contact with a maintenance group located at the in-house company has been introduced. Starting from that period, key users participated in meetings with the in-house maintenance group to take decisions about software enhancements, provide observations and

approve all analysis and design documents from the maintenance group and give feedbacks on the prototype version of the system.

4.2.1   Key users- developers

The reference person of the ERP project implementation in the Dante Province describes the key user as an important role in the post-implementation period of the biography of the ERP project. The key user has the role to represent employee requests of technical support to the IT maintenance group, asking required personalizations. At the same time, key users have to know the system, be aware of what the consequences of personalization are and be able to communicate to their colleagues how they can better work with the standard version of it:

"Key users have a fundamental relevance. In some modules there are key users that force themselves to learn about the system and a big deal about the processes. There are instead key users that are not always able to negotiate with the others. Some others find an agreement with everybody, perhaps because they do not follow their ideas to the end. And this is not good. (ERP Project reference person).

Key users found that the SAP as it was first implemented before 2002 was not adequate:

"The standard SAP PS module was not good, because the public administration has constraints about authorization, balance, allocations. The private sector does not have such rigid constraints. The standard version of the module did not have cross-controls; there was no integration, neither with administrative provisions, nor with the accounting. Then it was as having information in separate and totally unrelated boxes" (Key User Planning Division).

A number of personalizations took place starting from that period. An important aspect of personalizations concerns the relevant decision process. In the Dante Province, all decisions about personalization were taken in meetings between the Planning Division and the Accounting Division key users with the maintenance group of the in-house IT company. Planning and Accounting are Staff divisions. They do not directly use the system. Their role is to monitor what Operative Service do with the system. Only when decisions taken by Staff Services key users required personalization costing more than 10 working days from the maintenance group, they were submitted to the IT Division. Otherwise, the IT Division was not involved in the decision.

Customizations taking place during that period (that we term the era of personalizations) are presented by the key users as required because "informatics must be coherent with the provisions" (Key User Planning Division). Each of the 14 different Operative Services long-term budget plans include management particularities mandated by the law according to the specific service they provide (highway administration, emergency management have specific management requirements that are not shared by other kind of Operative Services). Thus, in order to be fully compliant with the regulation, the overall customized version in use included all the possible exceptions that are found in each Operative Service:

"There are some plans that can directly commit. They do not have to book funding. They are the highway administration, the local autonomies and the disaster management services. Then, for the 'control of the budget commitment availability, plans working with this particular typology have to be foreseen. Then, in the registry information of the plan, a function has been added to specify: 'Does this plan require to book funding?' since the system has to identify what kind of control to apply. Then there are some plans that are divided in sections. The aggregated vision of the sections at the level of the plan has been added as a further function to the module." (Key User Planning Service).

A representative of the IT maintenance group describes this situation as follows: " In SAP we did a very rich reporting, extremely rich and extremely sophisticated I would say [...]. So, in theory, if the SAP reports are not complete, I do not really know what can be more complete" (IT Analyst). When it comes to consider the technical point of view, the same interviewee tells, "the interventions on SAP are done on a system that is 99% personalized [...]. When there is to upgrade, when there are new releases, we

have to put the hands on all the previous personalizations. Then every time is like it is a new implementation project" (IT Analyst).

4.2.2   Accounting key user - planning key user

Conversations highlights that the amount of the personalization required presents an unbalancing towards the accounting functionalities. The reference person of the SAP project tells about the SAP implementation:

"We wanted to see SAP from the point of view of the project or of the plan, not from the accounting point of view [...]. But the logic has been changed." (SAP Project reference person, Dante Province).

The key user of the Planning Service tells that during the analysis phase of the SAP module that her service was going to use (the Project System - PS - module) they often met with the Accounting Service key user, because many planning aspect required "the sharing and the agreement by the Accounting Service" (Key User Planning Service). The relation of key user with each others shapes the implementation and the post-implementation aspects of the module in different ways. In the implementation phase, their decision implies the amount of cross-controls between the Accounting and the Planning modules. Typically, cross-controls are in place when at stake is to control the coherence and the regularity of the Line-Services inputs. Automatic controls generate blocking messages on Operative Services operations if their are not compliant with both the restrictions set on the system by both the Planning and the Accounting key users. Controls are manual, that is they do not generate blocking messages, but only warning messages - when they concern cross-checking between the data on the Planning module and on the Accounting module.

During the post-implementation period "changes in the system might have a domino effect: you change sosmething and something happens somewhere else in the system that you did not expect" (Accounting key user). This generates problems with the identification of who is responsible for what when it is to identify problems, try to solve them or report them to the maintenance group: "Since accounting and planning modules are two integrated modules, it is not always immediate to identify what can be a problem. When you notice a problem you are not able to understand: is this a problem of the planning module, or is this a problem of accouting...And then who to address for this" (Key User Accounting).

4.2.3   Key users - final users

Where the interviewed key users fully agree is on the required customizations on SAP in that they represent useful features for the Line Services. According to both key users, the on-line controls and the reports provided by the system allow the Line Services to have respectively (i) the confidence to do not forget anything or make mistakes in the data input, and (ii) to have the update situation of their project available:

"The controls and the reports are mainly made for the Operative structures. With the controls, the operative services are confident that they can not make mistakes. And reports allow them to have all information, like the availability to invest" (Key User Planning Service).

However, from the observations the fieldworker accomplished during a major evolution of the system, it emerged that each Staff Structure (and their related key users) has a different monitoring styles. This requires the Line Service operators to duplicate their efforts to comply with the Staff structures monitoring requirements. They have to provide different types of document containing the same data to different Staff Structures: some of these documents even include the use of additional software extra-SAP. An illustration of this is that while the Planning key user is content with the report that is automatically generated by the system, the Accounting Key User does not like it: " It is not an easy to read file! They had to have it all on a single page!"(Accounting Key User). As a consequence, in order to perform the relevant controls, she asks the Line Services to provide a spreadsheet in the replacement of

the SAP automatically generated reports, with an half-page table summary of the total budget chapter per year.

Line Services themselves are also keeping external data records on spreadsheets, due to a lack of project management functionalities of the SAP module. The PS format requires that once data are inserted for each budget item, the total should immediately correspond to the financial coverage. According to our observations, employee simulate the plan in a spreadsheet before including it into the PS system: "In Excel abbiamo simulato il piano, abbiamo fatto vari tentativi per impegnare al meglio le risorse disponibili, spostando e compensando vari costi e, dopo aver trovato la soluzione migliore, abbiamo detto: 'ok, dal punto di vista contabile così può andare bene'. In PS non si può fare questo lavoro di simulazione di varie prove, perchè è rigido: si inserisce la versione finale" (Line Service Employee using PS).

4.3 From the in-house IT company to SAP external consultancy (2005-2008)

The third locational pattern that has been identified corresponds to a strong presence of the technology supplier external consultancy. From June 2005 in, Dante Province feasibility studies about the introduction of new SAP modules are made by SAP consultants. According to the project responsible, the presence of an external consultant allowed Dante Province to learn from others. At the time the ERP implementation project begun, Dante Province was the first Italian Public Administration carrying on such a project. In 2005, there were many other P.A. implementing their SAP ERP system. Identifying an external consultant became then an opportunity to look outside her own organization to how other organizational contexts acted about similar projects. Looking backwards to the previous period, she told that by doing everything in-house, they also did some errors. The in-house company was strongly conditioned by the Accounting Department. Her role as a project manager at that time was to tell IT people from the in-house company to insist when an adaptation was not feasible. But when the Head of the Accounting Department raised her voice, the IT people did everything she needed, increasing the number of 'personalizations'. According to her view, the personalization where only good for change management strategic purposes, not for functional reasons.

"Instead of encountering a rejection of the system, I can do some personalizations in the spirit that after the user 'jumps the river', I will be the rule-maker..."

But the in-house company never contributed to this strategic point of view. Her role as project manager was not relevant enough to modify the current state of affairs. IT people from the in-house company were willing to please the users from the Dante Province "those who will pay the bill at the end" and a special role in this respect was that of the Head of the Accounting Department. Contrasts on issues like standardization or personalization of the system between the in-house company and the Head of the Accounting Department were constantly avoided. In order to modify the current situation - that we termed the 'era of personalizations' - the project manager then decided that the partnership between the in-house company and the technology supplier was to be better exploited by involving technology suppliers consultants. The reason was just that in 1998 there was neither a public administration implementing SAP nor a consultant knowing the public sector as an implementation context. After some years, other administration started to implement SAP. As a consequence, consultants were around having experiences of SAP implementation in the public sector. While direct reuse (e.g. duplication) of software was unlikely, since each local administration had its own regulations, the sharing of experiences (and even of names of reliable consultants) started to be a value for the public administration having implemented SAP. In 2004, a Public Sector User Group has been held at the national level to share implementation experiences. The User Group experiment did not last for long, since the effectiveness to share experience on the information system ws highly undermined by the degree of difference between each local government regulatory framework. However, local experiment of reuse between different organization took place. In the Dante Province case, a consultant that already worked for a neighbour local administration in the implementation of the Material

Management module (MM) has been hired for the same purpose. He made an industrial version of the customized module, setting some parameters to be adapted to each single user integration or regulatory requrements. The same consultant worked for two neighbour regional administrations, providing a standard version of the SAP module and the consultancy for adaptation and maintenance in addition to it. At the same time the key users of the two different admnistrations were talking to each other, trying to do the same interpretations of the integration and regulatory requirements and triangulating with a common consultant serving them both.

4.4   From the SAP consultant to the a multi-partner Consortium (2009-)

Despite the different advise from the ERP diffusion project manager, in the case of the Real Estate Management module, a consortium made by academic partners, consultants and the in-house company has been appointed to provide consultancy. Consultancy provided directly by the technology supplier is not provided any more. The ERP project manager describes the situation as a pity. According to her advise, the best choice would have been instead to go for the consultant knowing more about the system. Knowing less about the system and not having experience about implementation of that specific module in the public sector, the consortium is described by the interviewee as having made Dante Province loose time during the feasibility study. She describes the situation as a 'going back' to the 2002-2005 period (the 'era of personalizations'), where many personalizations were performed with the allowance of the in-house IT company. The reason of the choice to go for a consortium instead that for the SAP consultant was made by Dante Province in-house company. The IT in-house company, being the leader of the local IT market, wanted to exploit the same consortium that was built to implement the SAP system in the local University.

5   DISCUSSION

In this session I discuss the different ages in the implementation biography of the SAP system in Dante Province in term of the locational patterns of the interactions taking place in the design/use space, putting a special focus on the structure of the innovating network, the consitution of the organizations involved and the identities of the actors. The Social Learning in Technological Innovation (SLTI) framework will be applied for data interpretation (Stewart and Hyysalo, 2008). My effort will be to contribute towards the depiction of the evolution of the space of social learning in the biography of ERP projects in Dante Province, presenting a synoptic chart of the locational patterns that took place at different times.

5.1   The technological experiment

The first locational pattern (Fig.1) is charaterized by a unity between the project management needs, the technical point of view and the organizational needs. The technical point of view is represented by both the in-house IT consultants and by representatives of the IT department as well. All are represented and work together in the implementation team. Feasibility, functional analysis, programming and implementation are performed in close connection by a group of people working in team. In this pattern, the emerging feature of the technological solution is one of a standardized SAP that represents the "official" source of data. The tasks concerning the particular work of each organizational unit is proposed to be carried on by the operators by using other legacy applications. According to the Social Learning in Technological Innovation (SLTI) framework, this is the typical design/use space configuration of a technological experiment, where users, developers and suppliers (Jaeger et al., 2000; Brown et al.,2003), often deliberately construct into a constituency by certain key players to provide a framework of ideas and resources to shape innovation (Molina, 1995).
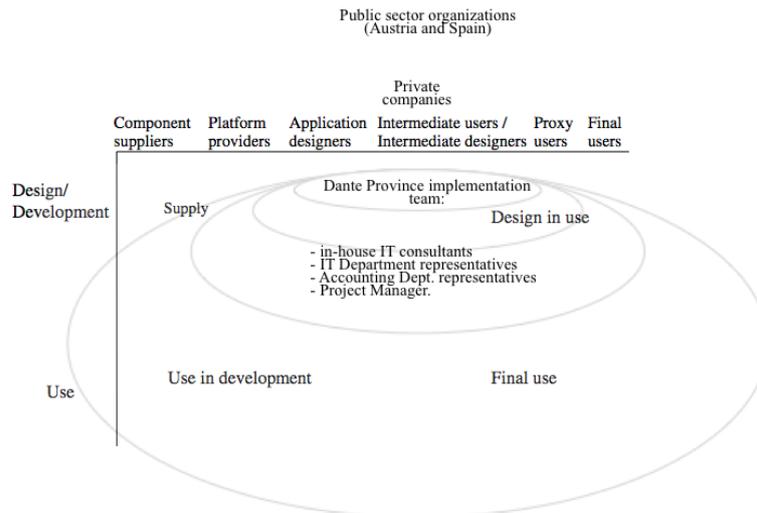
Fig.1 Technological experiment (adapted from Williams, 2005)

The role of the Dante Province as an intermediate organization in this space is a crucial one. At the time were the implementation team was working in Dante Province, there were only private companies or foreign public administration adopting SAP. According to the ERP implementation project manager, learning from others was not an opportunity at that time. Anyhow, it would have been easier to learn from the italian private companies ("Either for companies or public administrations, accounting is a standard package.") than from foreing public administrations ("...they have an Aglo-Saxon accounting model. We have a latin model. In the Aglo-Saxon model controls are all final. Ours are all estimate"). The space where interactions between design and use take place is smaller here, while other intermediary organizations populate remote areas of the extended countour, with very few interactions with Dante Province.

5.2   The intermediary and proxy user centred design

The period that I identified as the 'era of personalizations' corresponds to a locational pattern that concerns the activities of a range of users in actually getting the SAP to work after-implementation. The configuration of the interactional space between design and use here is not a temporary ad-hoc configuration, like that of a task force or of the constituency we found at work for the implementation of SAP in Dante Province. It is more like a cross-units institutionalized division of labour. In this period, the project management task, the task to deal with technical aspects (feasibility, functional analysis, design and implementation) and that of gathering the organizational requirement are formally distributed across units in the organization. A relevant role in this newly patterned intermediate space is that of the key user. The key user is an intermediary role carried by an individual that refers to a specific unit in the organization. She has to bridge links between the functional area she is part of and the technical people of the in-house IT company. According to our framework, key users are a kind of "proxy user" and "intermediate user" as well. Key users are "proxy users" in that, while working in close connection with the in-house IT developers, they have to represent both their functional unit requirements and the final users - the Operative Services users - requirements. But key users are also "intermediary users" in that, since developers are not member of the same organization (they are part of an in-house company), they act like an interface of the entire organization (the Dante Province) to an external partner.
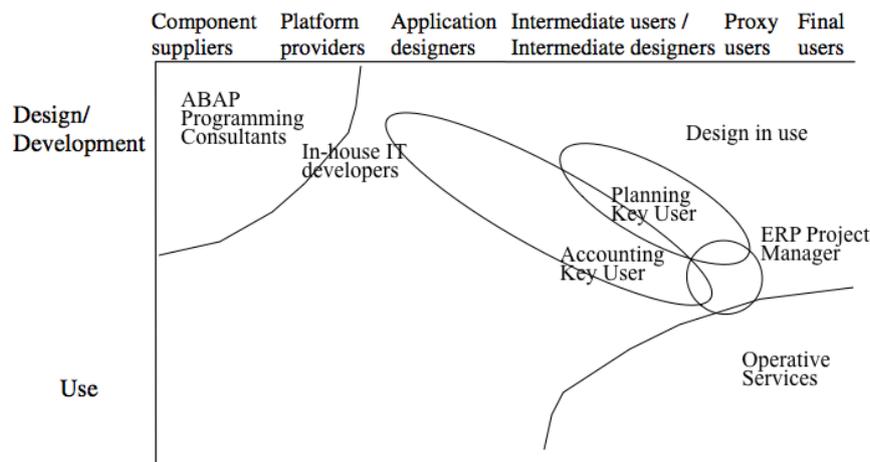
Component   Platform   Application   Intermediate users /   Proxy   Final
suppliers   providers   designers   Intermediate designers   users   users

Design/
Development

ABAP
Programming
Consultants

In-house IT
developers

Design in use

Planning
Key User

ERP Project
Manager

Accounting
Key User

Operative
Services

Use

Fig.2 Intermediary and proxy user design (adapted from Williams, 2005)

In their role of "intermediary users", key users interact with in-house IT developers by raising issues of regulation deriving from their administrative background and contrast them with issues of technical feasibility coming from the in-house IT developers. Whenever a regulation mandates an exception in the procedure, key user strived to get the exception implemented in the system. There is not an overall IT Department control over key users decisions. This control intervenes only for software enhancement projects that are larger than 10 working days. In the ordinary management, there is not any formal decision-making process that foresees a check of the IT department over key user decisions. Since contrasts between key user requirements and technical feasibility issues are constantly avoided by the IT developers in their role of in-house suppliers, the absence of an internal intermediation by a competent IT department representative resulted in the straightforward approval of any requirement key user would have presented in that period. This is especially relevant as key users do not take into account the system development drawbacks of their requests. A condition that intensifies a tendency of this pattern to produce 'personalizations' is the move of the ERP project manager from the IT department to the Accounting Department. The ERP project manager is no longer perceived by the key users she has to negotiate with as an IT person in staff to them. Rather, she becomes perceived as holding the stake of the Accounting Department. Key users will be resistant to accept the mediation of a project manager coming from a sector-specific functional division. The in-house IT company to its turn has to negotiate the realization of the system with the Accounting Department instead of with the IT Department, with consequent priorities assigned to accounting aspects of the system. As mentioned before, key users are also "proxy users" in that while working in close connection with the developers they have to represent both their requirements (Staff services requirements) and the final users - the Operative Services users - requirements.

5.3   Innofusion

The third locational pattern of the implementation biography of SAP in Dante Province can be interpreted as a space of innofusion (Fleck, 1988). The innovation does not come any more from a single identifiable co-located source, e.g. from the interaction between Dante Province and its in-house IT company through a small number of key users. Rather, innovation takes place in a multi-sited and long lasting intermitted interaction between global producers and users from different public organizations. The ERP software companies in this space make initial customizations to systems built for other sectors or for other user organizations. Modifications made in-site by the consultants with the user IT staff become later incorporated as part of supplier's generic package, while some others

become discarded and kept up only locally. In this space, consultants become the key intermediary, not only between production and use, but also, and most importantly, between different user sites. Being closer to the production side, consultants are perceived by the Dante Province ERP project manager as providing more reliable feasibility studies than the in-house IT company people that do not have a comparable expertise on the specific topic, and are prone to accept any requirement from their customer. Being able to travel from an user site to another, consultants also act as intermediaries between different user organizations, in ways that overtake internal struggles between competing "proxy users", allowing re-use of solutions.

But together with the major role of the consultants as intermediaries, user organizations innovate their intermediating space as well. Public organizations can employ more indirect forms in order to impose their standards over other public administrations through the consultants. Being first first adopters of new modules becomes to be perceived as a value instead of a problem, like it was at the beginning. It allows to have consultants build in the software modules their procedures as a best practice for the public sector at large.

Being these the major features of production space, from the use side of the space this locational pattern corresponds to a transition of collaboration practices from a direct form to a more indirect one, both in term of contents and of means: key users of different public administrations start to exchange references of consultants they like and talk to each about the consultancy taking place, in order to try to do similar interpretations and to minimize the initial costs of consultancy. The content of the collaboration is both the reuse of the code and the comparison of performace of the consultant, in term of contracts as well as of less formal aspects of the relation. Public Sector user groups take place not only to exchange experiences of technological procurement but also of consultancy procurement on technology procurement, adaptation and maintenance.

5.4   Generification

The fourth pattern corresponds in Dante Province case to the strategic objective to enhance the systemic relations between different local public administrations, both from the production side and from the use side, in order to allow organizational information systems as well as organizational best practices concerning accounting, procurement, human resource management to travel from an organization to another in the region. From the production side, the idea to move from consultancy provided by the technology supplier to a Consortium that includes the local in-house IT company and other, more generic, consultancy companies corresponds to the idea that best practices have to be formed, exchanged and reused locally by different public administrations in different domains (health care, education, energy, etc...). From the use side, the idea is to bring the diffusion of SAP within the strategic goal of aligning a fragmented landscape of public sector organizations made of large organizations and smaller ones to common interpretations of organizational procedures.

6   CONCLUSIONS

My interpretation of the data allows to depict spaces of intermediation both from the production side and from the appropriation end. Each space affords access to specific resources and prevent access to some others and give centrality to different intermediations. Each period description enphasizes different layers of granularity of the problem. In the first space, the unity of project management, technical and organizational point of view allowed an interpretation of SAP as a standard system, with fewer personalizations. At the same time, learning was limited to a small group of people, without the opportunity to design the system for specific uses. Design for specific uses was not even perceived in the production space as an opportunity leading to best practices formulation and reuse. In the second time-space configuration, that I described as a "proxy/intermediary user centred design" the presence of more intermediaries from the appropriation end allowed for a more personal interpretation of the SAP system, although never leading to an effective inclusion of Operative Service user requirements. At

the same time, a shallower intermediary configuration was emerging in the production end in which the distance of the IT Department from the resources for decision making on SAP implementation - delegating IT decisions to the in-house IT company in connection with few sector-specific key users; moving the ERP project manager to the accounting department - set the conditions for a loss of control on the technical consequences of the personalizations. The third locational pattern has been identified with a more distributed provision of innovation, where the consultants started to play a central role in the space of interaction between design and use of the SAP system. In the adoption end, an escalation to indirectness has been noticed. The content key users relations moved from issues related to technology procurement to issues of procurement of consultancy for technology procurement. Intermediaries of the adoption end surrendered their space to intermediaries from the production end. With this escalation to indirect decision making, the role of top management becomes as relevant as never before: controlling the expenditures on consultancy on technology procurement is an issue of their own. In continuity with this move to IT decision as strategic decisions - with political visibility as well, in the fourth period a Consortium of consultants becomes the key actor shaping the space of the network and the nature of the technological solution. The SAP system is enacted in this space as a resource for local development.

In each space domain the different granularity of the problem description produces an umbalance towards some aspects of the problems connected with the adoption of the technological solution. In the first space, the focus has been on the micro level of the implementation team interactions, focussing on the technical design and on the project management needs to role the system out, without too much attention for the involvement of the production end and of the use end intermediaries. In the second time, descriptive terms employed by interviewee allow to segment in detail the use end, while the production end becomes peripheral and out of control. The third space stresses the innovation of the production end, with the outsourcing to a SAP consultant being perceived as the solution to the loss of control on the production space. Management started to be involved, since the issue of external consultancy started to raise as political issues. As a consequence, the fourth space focuses on the benefit the region can profit from the adoption of complex organizational systems like ERP systems. While keeping the evolution of the overall social learning taking place is a difficult task to be managed, focussing on a single corner of the design/use interactional space can mislead implementation and post-implementation strategies. The analysis provided here wants to represent an intial contribution towards the depiction of the evolution of the space of social learning in the biography of ERP projects, presenting a synoptic chart of the locational patterns that took place at different times.

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