Towards an Approach to Assist Business Model and Supporting Information System Design

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Abstract
We propose an approach that designs complex business models and their underlying information systems. Since business models involve people and, thus, are social-technical, we studied the synergies between business model and social theories, in particular Actor-Network Theory and Structuration Theory. From this study it was possible to establish a set of procedure that gives a particular attention to the complex balances of interests, providing clues about the solution that best suites all the actors involved.

Keywords: Business Models, Requirements analysis, Actor-Network Theory and Structuration Theory.

1 INTRODUCTION

The nineties have seen a meaningful evolution in the connectivity of systems. The advent of the Internet, with the consequent proliferation of intranets and extranets, afforded radical changes in the communication formats (Tapscott, Ticoll et al. 2000). Companies now have the opportunity to define new inter-organizational processes, with different business rules, supported on web systems. It became possible to establish complex scenarios, where several organizations can cooperate, share goals, or compete for a particular advantage. These reconfigurations of the business landscape demand the revision of the traditional concepts and tools of analysis (Parolini 1999). It is urgent to introduce tools to address the full complexity of these business models, namely the intricate web of interests that must be managed and the new value creating opportunities. The uncertainty associated with the emergent value network configurations raises problems in forecasting their consequences to an organization and its ecosystem. The Dot-Com Crash confirms the difficulties in analyzing the soundness of such business models (Galbraith and Hale 2004), (Investopedia.Com). We propose an approach that designs complex business models, considering their social component, and that intends to provide insights about their viability. In the following sections, we start by describing the social inspirations used in the approach presented and their relationship with concepts of business model theory. Subsequently, we described the research methodology used and the reasons for its selection. We then move on to the presentation of the proposed approach. Finally, we draw some conclusions.
2 SOCIAL INSPIRATIONS

Since business models involve people and, thus, are social-technical systems, there is the necessity to complement business model theories with social theories. These theories can provide valuable insights to understand organizational, social and political viewpoints, so as to comprehend the interconnections between various stakeholders in a specific environment (Rose and Scheepers 2001). The contribution of the intersection between the theories mentioned must be acknowledge by the information systems that supports its activities (Lewis and Townson 2004). The connections between context, business model and information systems is reinforced by the fact that the latter are a crucial factor in the process of organizational restructuring (Applegate 1994). The proposal presented in this article is based on two social theories: Structuration Theory to describe the context of systems, and Actor-Network Theory to characterize the technical and social relationships of a business scenario.

2.1 Structuration Theory

Structuration Theory was proposed by Giddens (Giddens 1984). It studies social phenomena at a high level of abstraction, offering a descriptive view of the world, rather than an explanation of its mechanisms (Jones, Orlikowski et al. 2004). The key concepts of Structuration Theory are agency and structure. Human agency represents the capacity to make a difference and describes the actions that the actors may perform (Macome 2002). On the other hand, structure is defined as rules and resources implicated, through human agency, in social reproduction (Giddens 1984). The connection between agency and structure is described according to three dimensions represented in Figure 1.

Giddens identifies three dimension of structure, which he terms signification, domination and legitimation. These dimensions interact with human actions of communication, power and sanction through modalities of interpretative schemes, facilities and norms (Giddens 1984). When humans analyze and mobilize existing interpretive schemes, they acquire knowledge to act. Since humans possess the capacity to reflect on their own actions, they can decide on the maintenance, or not, of the existing structures. These practices highlight the patterns that constitute society, or try to establish new ones (through schemes, facilities and norms) that will, if accepted, institutionalize new characteristics in the social structures (Ferreira 2004). To capture the essence of the structure in which a network is created, maintained and modified, allows a better understanding of the very network and of its mechanisms. This tendency of relating a particular interaction with the context where it occurred is defended by authors such as (Hanseth and Monteiro 1998) and (Macome 2002).
The necessity of contextualization is even more important, when the system being analyzed belongs to different organizations and to different levels (for instance, local and central). It is important to comprehend how new structures associated with one particular network, may influence other networks, and consequently other systems. Struturation Theory doesn’t consider technical components and doesn’t provide guidelines of direction about its application to information systems (Monteiro Hanseth 1996). Therefore it is advantageous if its descriptive characteristics are used together with the Actor Networks Theory’s capacity to handle technical artefacts as just another actor. This perspective introduces a different way of describing the relationships of co-operation and conflicts, to verify the alignment of interests and the stability or irreversibility of achieved compromises.

2.2 Actor-Network Theory

Actor-Network Theory was introduced by Michel Callon and Bruno Latour in the beginning of the eighties (Callon and Latour 1981), (Callon 1986). Subsequently, it has been enriched by its original authors and others such as John Law (Law 1999) and Madeleine Akrich (Akrich 1992). The networks, as studied according to Actor-Network Theory, are systems of relationships, exchanges, alliances and negotiations between their elements (Underwood 1998). The actors can be heterogeneous – human or non-human (such as, people, machines, software and ideas) – but ANT describes them using the same language, and analyses them in the same way. Actor-Network Theory considers that social and technical perspectives are entangled and, for that motive, they must be analyzed together and with the same degree of importance (Akrich and Latour 1992). Each actor has its own individual goals in the network. These goals gain relevance when, through a process of negotiation, they are shared by different actors, creating an alignment of interests. The capacity of mobilizing other actors in one’s behalf provides and increases the power and the influence of an actor in that position. The process of negotiation between the actors involves two concepts: translation and inscription. The former is responsible for the interpretation and conciliation of positions/commitments of individual actors, which can lead to representations of common interests (Callon and Latour 1981). The latter describes how patterns of behaviour are “wired” into the network, using artefacts, to create action programs (for instance, the rules of appliance to a scholarship) which the actors must fulfil (Latour 1991). Translation includes four distinct phases: problematization, interessement, enrolment and mobilization. In Problematization it is identified the problem that needs to be solved, relevant actors and possible spokesmen that will represent groups of actors (e.g. a union head represent workers). In this phase certain actors position themselves as an obligatory passage point between other actors and the network, becoming indispensable resources in the solution of the problem. Intersetissement encompasses a variety of strategies and mechanisms by which actors attempt to enrol others (includes looking for new allies and isolating actors not yet enrolled). Enrolment is achieved when actors take on the network’s problematization as their own and accept the roles defined for them during interessement. Finally, mobilization is a set of methods used to ensure that spokesmen will not betray the interests of their group (Callon 1986). The inscription defines program of actions that specify the requirements of the network, embedding the social agenda’s of the actors into technical artefacts, such as information systems. As inscriptions become stable and routine, they reduce the possibility of being challenged or questioned at a later date (Callon 1991). Actor-Network Theory allows a clear identification of the actors that are involved in a specific context and of their relationships. Furthermore, it permits to manage the alignment of interests between all the actors of a
system, or between different systems, describing the rules that they must follow and the activities that they must fulfil. For this reason, the networks can represent the concept of agency used in Structuration Theory. According to Actor-Network Theory, when a network achieves stability a black box is obtained. The black box represents a state of irreversibility, which makes possible the specification of requirements for the system modelled by the network. In this manner, it is possible to use all the information related with the negotiation processes, the actor’s goals and the way they interact to ground the requirements analysis. These requirements will be used in the specification of the information system that will support the existing network of interests and its business model.

3 BUSINESS MODELS AND SOCIAL THEORIES

According to (Timmers 1998) a business model describes how a business works. Specifically, he says that it must consist of:

- An architecture for the product, service and information flows, including a description of the various business actors and their roles;
- A value proposal: the description of the potential benefits for the various business actors;
- A financial model: the description of the sources of revenue that ensure sustainability.

This vision highlights the importance of identifying and describing all the actors involved in a business model, and, consequently, how value is created for each of them as a result of their interactions in a given context. On the other hand, the description of a business model as a network of actors, with particular goals and expectations, is amenable to analysis using actor-network theory and Structuration Theory. The transformations that resulted from the technological innovations have social and organizational consequences. On the other side, the participation of actors like technological users may introduce modifications in the existing structures. These occurrences can be analysed through social theories. The employment of a solution that includes these social concepts and the theoretical bases of business models encloses an enormous potential that we pretend to explore through the development of a business design approach, based in the theories mentioned. The results of the analysis must be reflected in the information systems that support the business model.

4 RESEARCH METHODOLOGY

Typically research approaches base their rigor and validity in principles such as problem decomposition, standardization of procedures, and collection of rigorous quantitative measures under the control of independent researchers. However, this becomes unfeasible in organizational settings. According to (Baskerville and Wood-Harper 1996) action-research can meet this challenge, considering the effects of specific changes in systems development methodologies. The rigor and validity in action-research is mainly achieved through its cyclic nature (Dick and Swepson 1994), (Baskerville and Wood-Harper 1996). In the first phase of the cycle, an intervention is planned (Planning), in the second phase, the proposed action is executed (Action), which will lead to a changed context. Finally, in the third phase, a critical analysis is carried out to extract lessons learned (Reflection). This will provide indications/clues about what to do in the following cycles, effectively building knowledge from one cycle to the next. Action-research is, thus, an adequate research approach to help us conceive the business model design methodology proposed in this study. Beginning with a fuzzy solution it is possible to test our assumptions, identify strengths and weaknesses, and
refine the solution iteratively in the course of the application of the emergent methodology to different field cases.

5 TOWARDS AN APPROACH TO ASSIST BUSINESS MODEL DESIGN

Our approach to designing or assessing a business model and its underlying information system is organized into three phases: the first studies the existing social-technical structure, the second identifies possible alignments between the actors, and the third records the requirements on which the actors have agreed. These requirements will be materialized in action programs that will result in the transformation or creation of the network.

Phase I

The first phase allows the comprehension of the existing relationships between the actors. The resulting knowledge enables the understanding of the networks, but also works as a valuable indicator of the necessity of modifying or creating the network, if it didn’t exist. It is organized as follows:

1. Identify the organizations involved in the scenario under analysis and describe their mission and goals. To provide a better understanding of their modus operandis is also suggested to identify the relevant interfaces of the organizations for the business scenario in study.

2. Describe the context using Structuration Theory, namely the factors that can influence behaviours and environment, according with the following topics:
   • Nature of agency (the goals to be accomplished);
   • Structure adjustments (the procedures that should be changed)
   • Existing power relations;
   • Interactions between actors of a specific context;
   • Institutionalized sanctions;
   • Existing rules;
   • Available facilities.

3. Characterize the actors:
   • Specify the actor relations with other actors;
   • Determine the relevance of each actor in the network;
   • Describe the roles played by each actor.
   • Identify the goals of each actor and, thus, its notion of value.

The information obtained in points 3 and 4 is recorded in dedicated forms.

4. Analyze, if it exists, the current network. That can be done through meetings, interviews or software analysis tools. Through the information obtained is possible to identify the activities performed by the actors in the network and characterize their interactions.

The interactions between the actors of a network influence their relationships, which can lead to modifications in the existing networks. These changes are based in negotiation processes between several actors, in which necessities, resemblances and differences must be identified and discussed. Through the knowledge acquired in this process, it is possible to create a space of discussion and cooperation that will allow the establishment of settlements between the actors and the creation or modification of new networks.
Phase II

The second phase of the technique is based on Actor-Network Theory and has as its main goal the alignment of interests between the actors, which is achieved in the course of negotiation processes. These processes should regard the following steps:

1. Apply the Actor-Network Theory’s concepts of problematization, interessement, enrollment (Callon 1986). After the recognition and acceptance of the necessity of change, it is essential to identify the requirements that represent the actor’s wishes and necessities. With the knowledge obtained in Phase I it is possible to define the initial stage of problematization. In this stage certain actors identify the problem, position themselves as indispensable resources in the solution and attempt to impose their definition of the problem and their suggested solution on other actors. Subsequently, the actors who proposed the solution engage a variety of strategies and mechanisms attempting to enrol other actors (interessement). When the actors accept the roles defined for them during interessement the stage of enrollment is achieved. This negotiation process can be supported by meetings, interviews or software analysis tools that can result in several inscriptions. These inscriptions should be discussed with the purpose of finding the most interesting solution for the problem.

2. Specify the inscription

The inscriptions define program of actions that represent the requirements established in the alignment of actors, embedding their social context in technical artefacts such as information systems. When defining program of actions it is necessary to identify the activities performed by the actors and to characterize their interactions. These interactions can be classified into flows of materials, flows of information, financial flows, or ability to influence others, as suggested by (Parolini 1999). We developed forms where it is possible to specify the activities performed by each actor and diagrams that represent the several types of interactions between the actors.

Phase III

1. Verify the stability of the network

The execution of activities generates value for one or more actors, but implies the effort of others. With the information obtained through the first three stages of Actor-Network Theory and recalling the activities previously identified in Phase II, point 2, it is possible to refine the value proposal for each actor. The flow of value proposals between the actors can also be represented through diagrams. The analysis of the value proposal for each actor can assist in the achievement of the alignment between the actors, which will lead to the stability of the network. It is necessary to determine the relevance that each actor’s attributes to each desired benefit (value proposal), as well as the effort it must spend to achieve it. This necessity is justified by the need to ensure that there is an acceptable trade-off between effort and benefits, so that the actor becomes interested in participating in the business model associated with the network. The study described in the previous paragraph evaluates the stability of the network. It allows discovering situations where the balance of effort and gain between the actors is not acceptable, which can compromise the stability of the network. In such case, the Phase II must be reviewed until a stable network is achieved.

The inscriptions carried out must be analysed with the aim of verifying that they represent the interests and the commitments assumed by the actors (mobilization). In this case, the
process of construction/transformation of the network is initiated. As the premises for decisions become inscribed in material artefacts, particularly information technologies, those artefacts assume the role of actors in the network.

6 CONCLUSION

We described an approach to assist business model design and their underlying information systems in complex scenarios. To develop the approach synergies between business model theories and social theories, in particular Actor-Network Theory and Structuration Theory, have been explored. Our aim is to design complex business scenarios and to reduce the uncertainty associated with their viability. In this designing process, it is given a particular attention to the complex balances of interests between the actors, which provides clues about the solution that best suits all the actors. The economic viability of the models is studied, according to an analysis of the value networks shaped by the actors. Through the contributions provide by the approach it is possible to implement an information supporting system with superior guarantees of success.

7 REFERENCES


