A Negotiation Game to Support Inter-organizational Business Case Development

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Abstract. Nowadays, an increasing number of organizations in the supply chain are involved in business collaborations. The success of such collaborations is, among others, highly dependent on joint investment in IT system implementations. In this paper we will discuss how business cases can be used to determine the costs and benefits of such investments for each actor. Using design science as a research paradigm we develop a serious game, called SID4IOP, that helps partners in inter-organizational settings to come to an equal distribution of the costs and benefits of an investment. We will show how the introduction of anonymity, a bidding mechanism and structured information disclosure can help project partners to reach agreement on the distribution of the costs.

Keywords: Business Case Development, Serious Gaming, Coordination, Negotiation, Supply Chain Network.

1 Introduction

More and more organizations in the modern supply chain are involved in business collaborations with partners in business networks. The success of these business collaborations is, among others, highly dependent on the interoperability of the participating organizations. To increase this type of enterprise interoperability between organizations certain investments in IT systems are needed. However, the coordination and negotiation between the different partners is often quite challenging. Most organizations are willing to share general information with other business partners to improve interoperability, but sharing more sensitive business layer information like how value is shared is more difficult. One of the main challenges in such networks of businesses is to determine where in the network the benefits of an investment will be realized. Following, developing a shared business case (BC) that includes an optimal distribution of the investment costs proves to be difficult and often involves a complex negotiation process. A method is needed that supports the sharing of business layer information to come to a joint BC.

In this paper we will introduce a serious game, called SID4IOP (Structured Information Disclosure for Inter Organizational Projects) that helps partners in a

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network to share information to equally distribute the costs and benefits in the network, by providing negotiation support. The game approaches the situation where three or more actors in a supply chain network investigate the option to implement an Information System (IS) to achieve their goals. As part of the project the actors need to collaborate and develop a joint BC for the investment.

SID4IOP helps project participants to arrive at a fair cost distribution by supporting the negotiation process. During the negotiation process actors are making bids for their cost share. The method uses input from each individual BC to arrive at a shared quantitative BC. During the negotiation process more and more information is structurally disclosed to the participants.

Earlier research shows that the following factors have an influence on the willingness of actors to share information and cooperate to come to a joint BC: consensus of goals (Daneva and Wieringa, 2006), cultural and semantic similarities and the willingness of the actor to share information (Bolton et al., 2008, Schein, 2004). Trust and hidden profiles are two additional factors that are found to influence the decision-making process in inter-organizational projects (Eckartz et al., 2012). Our game is developed for dynamic business networks where the partners do not have long-term business relations with each other and thus trust is limited.

A method to structure the process is necessary, whenever there are no fixed rules or procedures to deal with the opposing preferences of multiple actors (Thompson, 1990) This is the situation when a shared BC is developed in an inter-organizational network. The existing literature identifies four main ways of dealing with opposing preferences: negotiation, mediation, struggle and arbitration (Carnevale & Pruitt, 1992). Negotiation and mediation have been deemed the most successful as they are less costly and friendlier than struggle. They further make it easier to find an acceptable solution for all actors and will be used in our solution. Empirical research has shown that group decision support systems (GDSS) fit well for highly complex problems with a lack of structure (DeSanctis, 2008), like it is the case for business case development (BCD) in inter-organizational projects. GDSS can improve decision quality and time efficiency in negotiation processes. GDSS are less suitable for group meetings that involve "one-to-many" communications. In this research we develop a serious game that provides negotiation support when developing the BC for IS implementation projects.

2 Research Method

We follow a design science paradigm in this research. This paper describes the solution design process following method engineering (Keith, 2010). Based on our literature analysis we started designing the SID4IOP game. Informal discussions with experts from industry as well as academia, iteratively improved the game until it finally reached its current format. During the design process we continuously collected feedback from experts in their field. The final validation of the SID4IOP was planned as an experiment, and we performed several pilot experiments during the design process to improve the game before the actual experiments were deployed.

We performed two types of pilot experiments: a) Two pilots with students to iteratively assess the functionality, efficacy and playability (Aldrich, 2009). During these experiments all bugs were repaired; b) Three pilots with academics that have low to medium experience with IS investment decision making. During these three pilots we iteratively improved our game and guidelines that we used to explain the purpose and steps of the experiment process.

One important step in design science is the solution validation. In order to test our serious game on its practical applicability we deployed it during four experiments with experts. We will discuss the validation process and present the findings in Section 4. But before we will discuss the design process, the game -and simulation logic and the presentation of SID4IOP, in section 3.

3 Introduction of SID4IOP

In this section of the paper we will introduce the outcome of our design research, SID4IOP. The serious game is designed to deliver the following contributions:

- Provide stakeholders in a complex and unstructured problem context with a structure that supports their decision making process.
- Help stakeholders in inter-organizational projects to come to an agreement on a shared BC, focusing on agreeing on a fair distribution of the investment costs.
- Hide the identity of the participating stakeholders to each other and keep their sensitive BC data confidential. Thus, no harm is done to stakeholders that need to cooperate in future projects or that are partially competitors.

3.1 Method Concepts behind SID4IOP

In this section we describe the concepts behind SID4IOP and the mechanisms that explain their impact and importance.

BC Data Input. One of the crucial elements of SID4IOP is the data that it is based on. All stakeholders involved in the project are required to prepare an individual BC for the project. This individual BC should include an analysis of the impact of the project specifying the expected costs and benefits of the investment. This information can be provided as input by the host of the serious gaming session.

Anonymous Information Exchange and Chatting. SID4IOP is built in such a way that each stakeholder owns parts of the total information. The anonymous chatting possibility of the method encourages the actors to communicate with each other and pool their unique knowledge to determine the best distribution of the costs. However, each individual stakeholder can decide to keep some information private during the entire negotiation process. The anonymous chatting facility gives the stakeholders the opportunity to discuss the motivations for their bid/cost distribution without revealing their identity.

Facilitator. The game makes use of a facilitator (either human or a smart system) to support the decision and negotiation process. He or she ensures that the game is filled with BC data as input for the cost distribution process. The facilitator is able to access the information of all stakeholders and thus has an overview of all financial information available. Having such an overview allows the facilitator to support the decision and negotiation process more effectively. By brokering the information the facilitator is in the ideal position to control the information disclosing process described below as part of the process formalization (Valley et al. 1995)

Base Factors for Cost Distribution. Before the start of the negotiation process several base factors can be entered into the game. These base factors will be used to calculate the cost share of each actor. These numbers will be disclosed later on in the process. Two commonly used base factors are expected profit of the investment and usage of the system.

Process Formalization. The SID4IOP formalizes the negotiation process by (i) introducing an online bidding process and (ii) providing a structure for controlling the disclosure of information about other stakeholders. The structure provided by SID4IOP is expected to help the participants to focus on the actual discussion during the decision making process and do not get distracted by random talk and the repetition of already know facts. SID4IOP suggests the following schema (Table 1) for the disclosure of information during the bidding process. The facilitator decides on certain base factors, e.g. Factor A and B. He also determines the point in time (Round x+y) when individual information is disclosed during the serious game in order to progress from the free bidding stage. During the structured information disclosure the facilitator can decide to either (i) increase the process duration by disclosing the individual information in three separate rounds; or (ii) shorten the process by disclosing all base factor information in one round. The same is true for the disclosure of information about the base factors of the other actors.

Table 1. Pattern for information disclosure

	Round x	**Round x+y**	**Round …**	**Round x+n**
No information is shared = free bidding	X			
Individual financial information is shared		Factor A	Factor B	
Financial information about all actors is shared				Factor A…

3.2 Techniques and Tools behind SID4IOP

We build the serious game based on the free, web-based office suit "Google Docs" which allows for real-time collaboration with multiple stakeholders.

In order to support the BCD process, we develop two types of documents ((i) a master data sheet, which is only available to the facilitator of the negotiation process, and (ii) one specific dashboard per stakeholder showing, among others, individual information, like the individual BC. The master data sheet is linked to all stakeholder specific sheets. The facilitator can send and retrieve data through the tool to/ from the participants. He has the total overview of all financial game story data and bidding transactional data and can intervene accordingly. The participants get access to a simple chat web-interface (via gmail) that allows them to chat with one or several other actors during the course of the negotiation. The chat can be logged and saved for later analysis. Next to that each player gets a dashboard consisting out of the following six screens:

Process steps. An overview sheet where all steps of the negotiation process are shortly described.

Role Description. A sheet, which for each stakeholder containa a role description of his or her individual role in the serious game. It also includes a short role description of all other actors (business units), including sales and profit numbers.

Bid Form. A sheet where an overview of the individual bids is shown.

Financial Information/ Input. A sheet, which contains financial information such as the BC for each stakeholder. The data includes key figures, the profitability of the stakeholder, the costs and benefits expected from the investment and some additional information about e.g. changes in the number of employees.

Feedback Form. A sheet, which provides the participants with feedback on their bids (e.g. if the total amount of costs already got divided or not). After each round an overview of the bids of all other actors is shown. Most importantly, this is the sheet where the extra information, that participants can take into account for their next bid, is shown from a certain point onwards.

Worksheet. A final sheet (unprotected), named "worksheet" is provided to the participants to offer them some space where they can make their own calculations.

3.3 SID4IOP – Deployment Process

SID4IOP is deployed during the project preparation phase to support the BCD for an IS investment in an inter-organizational setting. More particular in the phase when the different BCs are consolidated and project participants try to find agreement on a payment structure. We divide the BCD process and thus also our serious game into three phases: start-up, negotiation and closing.

Start-up Phase. The *facilitator* makes sure that all *stakeholders* have access to the game. Each player gets access to a dashboard. Each stakeholder (internally) determines his own BC for the project and enters that data into the system using the input screen described above. The BC should contain financial information about the

current and expected situation. The stakeholders are further encouraged to enter information about their expected benefits into the system.

Negotiation Phase. As soon as all information is entered into the system, the actual negotiation phase is beginning. The negotiation process is structured through bidding rounds and supported by our tool. Our experiments showed that a maximum of seven bidding rounds results in an efficient bidding process. Each round should last at least 5 minutes, but if the project team has more time available, this time span can easily be extended to allow stakeholders to make calculations, chat with each other and come to a profound decision about the height of their bid. Once all actors entered the amount that they are willing to contribute into the system, the system calculates the total and compares it with the total costs to be distributed. The stakeholders receive feedback about the difference to the total and the bids of the others via the system. During the entire negotiation process stakeholders are encouraged to make use of the anonymous chat program provided by the tool. Our method proposes to structurally make information about the individual financial situation available: First to the individual stakeholders, later to all stakeholders. Once the sum of all bids is equal or larger than the costs to be distributed, the bidding process is stopped. In the case that the sum is larger, a new cost distribution will be calculated based on the last proportion of the bids. This final cost distribution will be shown to the stakeholders via the system for approval.

Closing Phase. Once the entire costs of the investment are distributed among the stakeholders and all participants agree upon this distribution, the negotiation process is closed. Now, the fraction of the costs taken over by each stakeholder is entered into the individual BC of that stakeholder. Further, the shared BC is finalized and the game ends.

4 Validation

We conducted four experiments, with five experts each, to validate the deployment of our SID4IOP game. We especially analyzed the impact of anonymity, the process of structured information disclosure and influence of the possibility to see the bids of the other actors on the BCD process and outcome. During the experiment we used a shared service center case to deploy the serious game. We observed the bidding and chat behavior of the experiment participants and conducted multiple surveys before and after the experiment. In the ex- Ante survey we investigated the experiences and maturity of the participants. Summarizing our population includes a majority of senior business consultants with medium to high amount of experience with business cases.

Analyzing the process during the game play we found that both the benchmarks and the information that was made structurally available influenced the bidding behavior and helped participants to find a reasonable bid. This was reported by the majority of the participants during the evaluation after the game. We also see that the four instances of game play each have their own dynamic and we cannot conclude a kind of generic pattern between these four experiments. The bids, timing and benchmarks differ and during the gameplay it is the coincidental interplay between the different actors that mostly influences the course in the game. This is exemplified by our analysis of the chat logs. In one experiment there was an emphasized

discussion between two actors and the others only followed their discussion and based their actions on this. In the other experiments one actor initiated a group chat and a more group dialogue evolved. But the content of the chat logs reveals a generic structure in the sense that we discern three main subjects the participants like to discuss and share; i) bid information, ii) social pressure, iii) sharing information.

Finally analyzing the evaluation of the game itself and its effectiveness we used a survey and panel discussion. The results of the ex Post survey show 70% were satisfied with the negotiation process as it was supported by the negotiation game. 50% of the participants were satisfied with the outcome of the game. 53% judge the process played in the serious game as being close to the real life BCD negotiation process. 82% of the experiment participants would use the serious game in a real life project situation.

The participants reported that the anonymous environment gave them an environment in which they felt safe to share parts of their sensitive information. The anonymous chat functionality produced a group dynamic in which information was shared and discussed and gradually social pressure was deployed to get to a more fair distribution of costs. Seeing the bids of the others was crucial to have a reference point and was further an important basis for discussion during the negotiation process. In our opinion there are two major observations: First, we observe that the outcome of the bidding process improved when more negotiation rounds were used, thus more information was structurally made available during the course of the game. This observation was shared by the participants. Secondly, we also see this effect causes the cost increase for sharing this information.

The experts note that the serious game would be very useful for large organizations, where not everybody has insights into the costs and benefits of the others, and often decisions are currently made based on rules of thumb.

5 Conclusion

This paper presents the design and validation of SID4IOP, a serious game that supports the structured, incremental disclosure of information during the BCD process. The focus of SID4IOP is especially on the last part of the BCD process, where costs and benefits need to be distributed among all participating actors in a way that is favorable to all actors and that is agreed as fair amongst all of them. Our various experiments during the design process show that the method can be very useful when different actors in a network need to agree on the entire BC. It also can be used parallel to existing analysis -and design methods that often are used to specify parts of the BC, e.g quantitative ROI or NPV techniques. The game simulation improves the negotiation process by providing a structure to this process, by allowing for anonymous information exchange and by introducing a bidding system. Especially these two elements distinguish the method from current BCD techniques. Our results show that our experienced testing participants evaluate our game as useful and effective. The gameplay and learning elements that are included in the game are recognized by the participants. Especially the negotiation mechanism and anonymous information exchange is valued as effective.

Our experiments and the panel discussions afterwards also show that the game as such can be used as a serious game to learn and gain experiences in a negotiation settings, but it can also be supplied with extensive real data and it then becomes a negotiation platform.

Projects with multiple stakeholders that discuss typical business case aspects can benefit from SID4IOP as it enables them to discuss it in a safe environment in which the key stakeholders decide for themselves what information they want to share, but also are facilitated via a structured bidding and negotiation process. We conclude that SID4IOP is usable for real life projects and currently we have been developing a dedicated web 2.0 based platform based upon the results of this study to increase quality of the gameplay and become independent from the Googledocs platform.

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