

Negotiation Support for Co-design of Business Services

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Abstract. During the last years, manufacturing and service industries faced a global change in the production paradigm. Besides the manufactured products, companies also focus their attention on business services that can add value to their products, which often need to be provided by different entities, offering different competences/services that collaborate to achieve a service-enhanced product. In this context, the collaborative process of design and/or creation of new business services can also be improved if supported by a negotiation environment that facilitates the interaction among the various involved entities, and the process of modeling and reaching agreements. For that, this paper presents a support system for service co-design negotiation that facilitates the design of new business services under a collaborative perspective.

Keywords: Collaborative Networks, Negotiation Support Environment, Service-enhanced Products, Business Service, Co-design, Service Design.

1 Introduction

Due to unstable and highly competitive business environments, companies and organizations need to adapt themselves in order to keep their market competitiveness. They need to continuously adjust their operating principles to act in response to a new business or collaboration opportunities. One trend is to move from traditional models to a new business paradigm, where enterprises strategically join competences and share skills, costs and other assets, and can access each other's markets, leading to new collaboration structures of enterprises [1]. In this context, the collaborative networks concept provides support in this change of paradigm, giving companies and organizations an expression of agility and survival mechanisms in facing market turbulences because they can share an interoperable structure, operating principles, and some cooperation agreements that can serve as a base of trust among them [2, 3]. Also, collaboration of enterprises and organizations imply the sharing of risks and losses, which increases their survival capability [4].

Nowadays, there is an increasing demand from customers for highly customized products. Therefore, one tendency for manufacturers is to associate business services to the products they offer [1]. From a collaborative perspective, these services are designed and created by multiple stakeholders to meet the individual customer needs and/or requirements. One approach is to follow a service design which typically is a

non-structured approach. Therefore, this paper presents a solution to improve the design of new business services that is being developed in the context of the European research project GloNet. This project aims to design, develop and deploy an agile virtual enterprise environment for networks of SMEs involved in highly customized and service-enhanced products through end-to-end collaboration with customers and local suppliers [5]. The major use case in the GloNet project are the solar parks, so the service enhanced-products are the physical solar plants (product) combined with the services that can enhance or improve the product. Here the interaction with the customer and local suppliers is fundamental and leads to the notion of co-creation and co-design of products and business services.

2 Negotiation Support in Collaborative Networks

To promptly respond to business or collaboration opportunities (BO/CO), the topic of collaborative networks (CNs) appears significantly promising because if the enterprises or the organizations share a common interoperable infrastructure, common operating principles, common cooperation agreements, and a base of trust among them, then their ability to rapidly form a virtual organization (VO) is increased [6]. If on one hand, the consortium formation process mainly consists on planning and scheduling the work order and selecting the appropriated partners to join the VO, on the other hand, the consortium associated risks, vulnerability, robustness and flexibility are also aspects that should be considered [4, 7]. In this respect, in the collaborative process of VO formation it is important to have a support environment to improve the entire negotiation process of establishing a VO agreement that can lead to the governing rules and principles of the consortium during the operation phase [8]. Moreover, a negotiation support environment should also improve the agility level of the VO formation, being agility an indicator of quality or state of the organization to have a quick resourceful and adaptable response [9]. To have an effective negotiation support environment for VO formation and to facilitate the decision making of human actors, some of the critical issues are [8, 9, 10]:

- Support for privacy of negotiations, where only the involved partners have access to the information being negotiated;
- Considering the potential risks in collaboration: reaching agreements concerning the sharing of risks among the involved partners;
- The agreement should follow a basic set of templates: It is important to depart from common templates, selected for each kind of BO/CO, and extend it to cope with the detailed agreement specifications using “add-on” clauses;
- Reaching agreements concerning coordination aspects, activities and scheduling;
- Reaching agreements about information exchange: i.e. how should information be exchanged among partners, and also which kind of information should be exchanged; and
- Provision of a mechanism for tracing the history of the negotiation.

3 GloNet Co-creation Networks

One of the relevant business scenarios identified in GloNet is aimed at providing an environment that supports and promotes the collaborative design of business services. This scenario pursues solutions to identified needs, in a co-creation network that is a particular case of a VO and represents the collaboration among manufacturers but also includes the customer so that his specific requirements can be properly met [1]. During the life-time of a certain product, several service co-creation networks might be created depending on the number of times new promising ideas come up for new business services [11] or when solutions must be achieved to solve problems. These networks shall be based on a collaboration environment that helps designing and providing business services based on innovation, knowledge and customer orientation, through collaboration between the different stakeholders. In this context, two main concepts are used: business services (BS) and service design.

Business Services and Composite Business Services. A business service refers to an organized set of added value activities from a business perspective [12], considering issues such as the delivery conditions, service level agreements, period, availability, etc. [1]. It corresponds either to the manual services, and/or software based services that are delivered to the customer, and can be modeled by different business processes. Also, the business services provided to the customer can be composed of several atomic business services. In this case, the service providers of such business services can together form a virtual organization to deliver the composite business service through a new entity that is the service integrator (that acts as the service provider of the composite business service) [13].

Service Design. Aims at designing user-oriented services making them useful, effective and different from existing ones. It is a methodological approach in the designing of services that connects relevant stakeholders from interdisciplinary areas. Therefore it potentiates co-design and co-creation among the different users of a service, and the providers [14]. Although numerous methods and tools have been emerging for service design [15], most of them are just manual methods to organize a collaborative process. Some methods are supported by software tools, but no integrated environment is available, neither any integration between service design and service delivery environments is available. Some of these tools can be found in <http://www.servicedesigntools.org/>.

4 Service Co-design Negotiation Support System

The proposed system intends to cope with one of the aims of GloNet that is to achieve an environment that supports and promotes the collaborative design of business services to enhance physical products.

To properly model the core processes involved in co-design, the main actors with the correspondent roles are identified in Table 1 and the dependencies between them related to goals and resources are illustrated in Fig. 1 using the i* modelling framework.

Table 1. Actors and roles in co-creation teams

<i>Actor</i>	<i>Role</i>
Co-creation Team	The Co-creation Team represents all the involved actors within the collaborative space aimed for co-design of services. These actors are essentially the VO Partners and the Customer.
VO Planner / Co-creation team mediator	The Co-creation team mediator is the VO partner responsible to conduct the entire co-design process. He acts similarly to the VO Planner in generic VOs.
VO Partners	The VO Partner gives support for the service co-design and co-innovation according to its knowledge and skills.
Customer	The Customer together with the VO Partners plays an important role in the service co-design once his satisfaction must be attained. He maybe also responsible for providing the services requirements and for giving feedback during the collaboration processes.

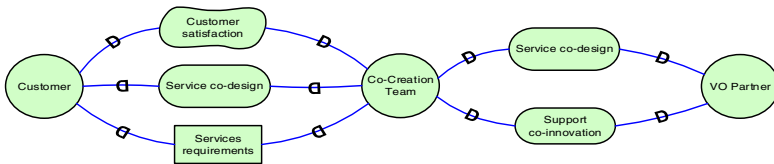


Fig. 1. Strategic dependency model for co-design

The co-design process is therefore conducted by a co-creation team mediator and can be initiated when a new innovation or requirement is identified either by the co-creation team or by the customer. Fig. 2 illustrates the co-design process being initiated by the co-creation team, where the strong interaction of the co-creation team (group of partners including the mediator) with the customer is illustrated.

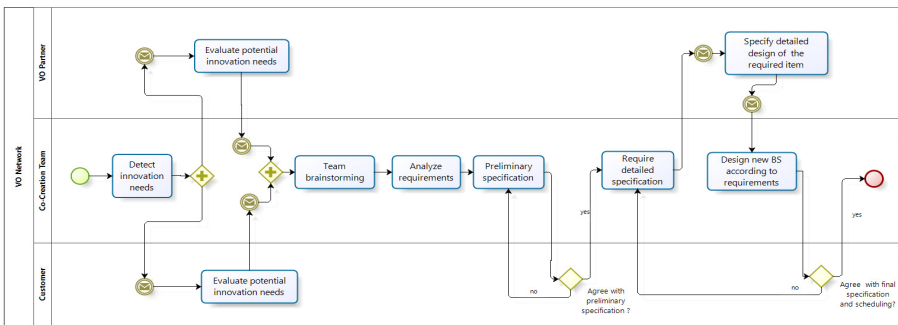


Fig. 2. Co-design process diagram

Considering the described process and that the GloNet project is not focused on designing specific business services but rather on creating a collaborative environment where new multi-stakeholder services can emerge and be provided, it is

evident that this collaborative environment should contain functionalities that combine collaborative aspects with methodologies already used for designing business services that allow the co-creation team to reach agreements on the specification of requirements. Therefore, in this context, a negotiation support environment, which copes with the requirements mentioned in section 2, facilitates collaboration in co-design. To prevent some potential collaboration risks, this environment also permits an assessment of partners' expectations and value systems alignment to avoid potential conflicts [9]. Being the main aim of the negotiation support environment to reach agreements between VO partners, the same mechanisms involved in the classical negotiation for VO formation can as well be used for the negotiation of the co-design of a new business service. The system description, is later presented in this section. Nevertheless, this negotiation should follow an established methodology, so a service design methodology is used and adapted, being the main steps summarized in Table 2 [16].

Table 2. Service design methodology

<i>Service Design steps</i>		<i>Description</i>
1	Identify needed service	Brainstorming exercise involving an analysis of the needs and characteristics of the customer.
2	Design touchpoints diagram	To identify user interaction points with the service.
3	Design blueprint diagram	To describe the nature and the characteristics of the service interaction in enough detail to verify, implement and maintain it. It includes: temporal order, timings, and line of visibility (denoting what the customer sees and <i>back-office</i>).
4	Storyboard / storytelling	A tool derived from the cinematographic tradition; it is the representation of use cases through a series of drawings or textual description, put together in a narrative sequence that illustrates a sequence of events such as a customer journey.
5	Service prototyping	Involving the selection, assembly and integration of the various service components (atomic services).

Besides the service design steps, it is also important to identify: who are the participants; the touchpoints with the customer; and how the participants can share information and documentation. Table 3 summarizes the relevant characteristics from service design and their relevance for co-creation teams.

Service Co-Design Negotiation Support System. The *Services Co-Design Negotiation Support (CoDeN)* system is intended to provide a collaborative environment for the design of new business services where the various involved participants can reach agreements on what is decided. In this process, the involved participants (including the customer) are defined from the beginning. As mentioned, similar to a negotiation support system for VO creation [8, 10], this system is also intended to cope with the requirements mentioned in section 2 and generate an

Table 3. Service design methodology in co-creation teams

	<i>Service Design characteristics</i>	<i>Relevance for co-creation teams</i>
Participants	Service design assumes the involvement of various participants from different backgrounds and specially the interaction with the customer.	Co-creation of a new service is expected to involve a temporary collaborative network (VO), including different stakeholders, from geographically dispersed manufacturers, to the providers and supporting institutions close to the customer. The customer is also an active part.
TouchPoints	In service design it is particularly relevant to identify the customer journey in the process of receiving the service, and thus the points of interaction with the service provider.	Aiming user-centered services and being the customer an active part of co-design, it is very important to consider his interactions with the service, namely the moments and places that he gets into direct contact with the service.
Sharing	Service design methods, even if not supported by software tools, a shared space where all participants can visualize the progression of the design process is assumed.	Collaborative environment where the involved participants can interact in the design and creation processes and reach agreements.

agreement that represents the reached consensus. Nevertheless, in this case, the consensus is reached based on a service design methodology that serves as a guide for the negotiation. Fig. 3 illustrates the main flow and interactions of the system considering the detailed specification of Fig. 2, and the numbered steps of the approach summarized in Table 2. The darker rectangles represent the negotiation interactions that are required in the co-design process.

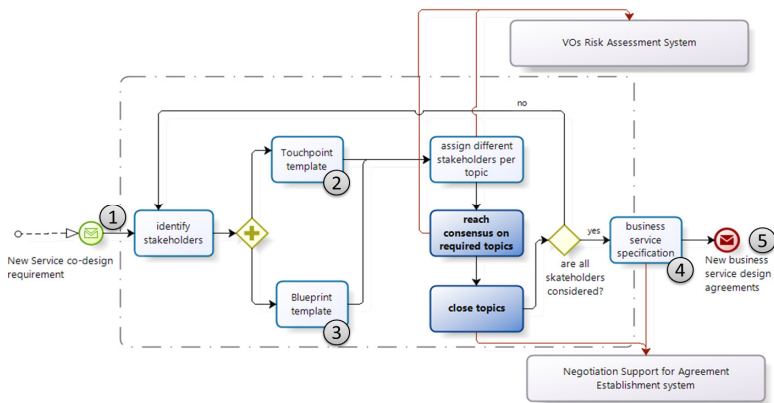


Fig. 3. Services co-design negotiation support system interactions

Also, this system interacts with two other systems so that it can on one hand assess the involved risks in the co-design process; and on the other hand provide reliable documentation. These systems are:

- *Negotiation Support for Agreement Establishment System* [8, 10] that allows clients to exchange information with warranty of authenticity and validity, digitally sign documentation, and providing a safe repository for saving and requesting documentation; and
- *VOs Risk Assessment System* [9] that allows the VO Planner or Co-creation team mediator to identify and assess the potential risks of a certain consortium concerning the value system alignment of the consortium members and their expectations towards collaboration, so that it can be possible to adjust the consortium according to the assessed indicators. Also, other potential conflicts or risk issues might be considered, such as economic or social.

Considering the above, Fig. 4 illustrates an adapted i* Rationale Strategic model where the involved actors as well as their dependency objectives with the system are illustrated. The functionalities that directly interact with the involved actors and other related systems are also depicted. The validation scenario for this system is planned and based on a real co-design case study. The case study is centered on the panel cleaning process of the solar plant of Charanka, in the north of India, which due to the geographical localization is of extreme importance in order to maintain or increase the performance ratio of the plant. The traditional process that this park follows is not supported by an ICT collaborative environment, thus most of the activities require a number of trips and face-to-face meetings with associated costs. Therefore, the usage of an ICT environment to support the process can be much more cost-effective either in economic terms or time spent.

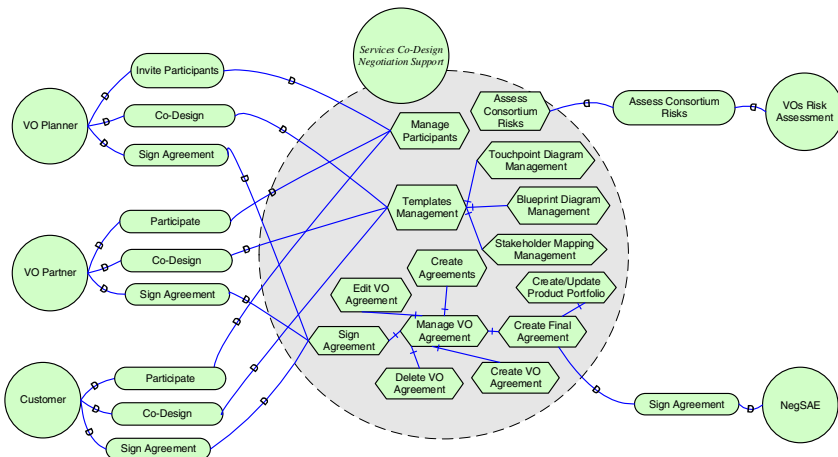


Fig. 4. Rationale strategic model for the services Co-design negotiation support system

In this scenario, after some brainstorming among the involved stakeholders, the idea of a new service for a soiling loss system came up. Fig. 5 illustrates the involved concepts for the scenario: the involved stakeholders, used templates, and ICT support system (CoDeN System). All the agreements on the design of the new business service are then reflected in cooperation agreements, which are digitally signed by all involved stakeholders. The final output of the system is a structured documentation set to support the development of the designed services.

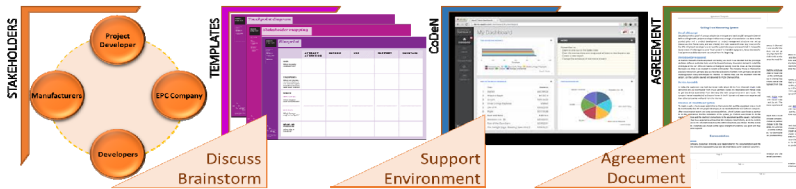


Fig. 5. Example of Soiling Loss Measuring System Co-Design

5 Conclusions

The work presented in this paper is the result of a service co-design negotiation support system specification aimed at supporting the co-creation team mediator in the negotiation process of a new business service design. The support environment to achieve agreements on the business service design is based on a software system that assists the human decision making and guides the generation of the final agreement based on service design methodology, making the process structured and traceable. Moreover, the intended environment is based on the same mechanism already specified in [8, 9, 10] for negotiation during a VO formation phase, meaning that it can be adaptable to different types of collaboration as is the case of classical VOs for business opportunities bidding and co-creation teams for the design of new business services. Also, and according to the planned validation scenario, the services co-design negotiation support system facilitates and makes the process of co-design of new business services more agile either in terms of time or adaptation.

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