SEAM in Business: A Systemic Method for Understanding Stakeholders' Needs in Value Networks

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Abstract

Understanding stakeholders' needs is necessary to design requirements for organizations and IT systems. We present a systemic modeling method to identify and categorize stakeholders within value networks, to analyze the relationships between these value networks and to infer IT requirements from this analysis. We illustrate the approach with an association who needs a web site. Thanks to this method, requirements that closely support the business strategy can be identified.

1 Introduction

When capturing the requirements for an IT system, it is important to identify the stakeholders and to understand their needs. Stakeholders are people who have a stake (i.e. can have a gain or a loss) related to the system [mw05]. These stakeholders might be in direct contact with the IT system. They might also be indirectly related to, or affected by, the IT system. An example of method to identify these stakeholders is given in [Alexander2004]. They propose, for example, the notions of political beneficiary, functional beneficiary, and financial beneficiary to identify some of the business-related stakeholders.

The identification of the business-related stakeholders is of growing importance with the increased emphasis on business/IT alignment. An IT system will achieve the company's goals only if the company's business-related stakeholders gain something out of the system introduction. Large companies have now created dedicated groups who have to justify all IT projects in terms of their business impact (e.g. concrete impact on the company brand). The method we propose can be used by these groups to define or assess their IT projects.

In this paper, we present *SEAM in Business*, a method to identify and analyze the business-related stakeholders and their needs. First a competitive analysis of the company who desires an IT system is realized: the business-related stakeholders and their needs are identified. From this, the "business-related" requirements of the IT System can be generated.

In Section 2, we present SEAM in Business. We illustrate how making a SEAM model contributes in identifying the requirements for an IT system. In Section 3, we illustrate the application of SEAM with a concrete example of web site development. In Section 4, we present the historical context of SEAM, its foundations and how the method was validated. Section 5, we describe the related work. In Section 6, we conclude with an outlook on future possible research.

2 Overview of SEAM in Business

In companies, multi-disciplinary teams apply SEAM to analyze a business situation. For this, they fill and review Excel forms that represent the relevant parts of the enterprise model. Three forms exist: (1) The **World Definition Form** for representing all segments in which a company is active (Section 2.1), (2) the **Segment Definition Form** for analyzing in details one segment (Section 2.2), and (3) the **Supplier / Adopter Relation Form** for analyzing the relations between the company of interest (together with its stakeholders) and the main adopter (together with its stakeholders) (Section 2.3). The method to fill these forms has to be participative (Section 2.4). Understanding the segments' actors and the supplier/adopter relationships of the company who desires an IT system is useful for designing the requirements for this IT system

2.1 World Definition

The World Definition Form lists the market and all segments of interest for a company. It acts like a table of contents for the overall analysis. Figure 1 illustrates the World Definition Form. Note that a same company can exist in multiple segments (e.g. "CompanyName6" in Figure 1).

Figure 1: World Definition Form.

2.2 Segment Definition

Segmentation is essential to reason about business. As described in [Wikipedia05] "Market segmentation is the process … of grouping a market (i.e. customers) into smaller subgroups. This… is derived from the recognition that the total market is often made up of submarkets (called 'segments'). These segments are homogeneous within (i.e. people in the segment are similar to each other in their attitudes about certain variables)."
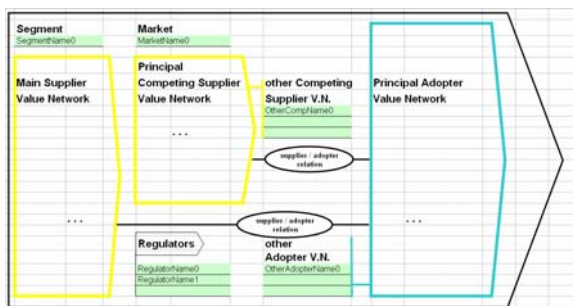

Figure 2: Segment Definition Form.

Segment analysis is central to SEAM in Business. We expand slightly the above definition as in our segments we consider all actors belonging to the segments (and not only the customer). In our segment, we have the suppliers (main and competing), the adopter – or customer – and the regulators.

Figure 2 represents the Segment Definition Form for one of the segments from the Figure 1. Our goal for this form is to have a tool to represent the dynamic of the complete business system within one segment (not limited to the relation to the customer).

To structure the actors present in a segment, we introduce the concept of value networks (inspired from the work of [Stabbel98]). A value network (VN) is a group of companies who share a common topic of interest. In each value network, one company is considered as the main one and so, is analyzed in more details. An example of value network is shown in Figure 3.
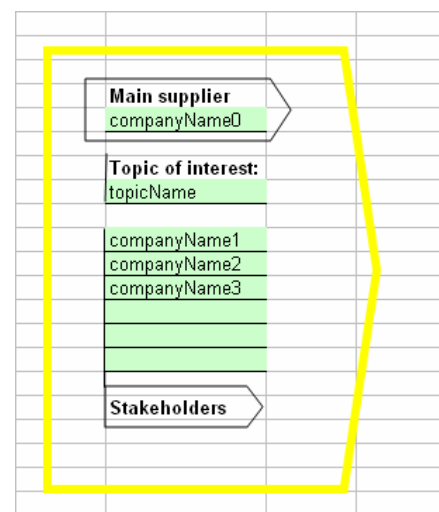

Figure 3: Main Supplier Value Network

We identify two kinds of value networks: the supplier value networks and the adopter value networks.

The supplier value networks are split in two: one main supplier VN (which has the company of interest as main company) and multiple competing supplier VNs. These value networks can again be split into two: one principal competing supplier VN (which will deserve a detailed analysis) and multiple other competing supplier VNs (listed for reference). Stakeholders in the supplier value network refer to companies who participate actively at the creation of the product or service delivered by the main supplier.

The adopter VNs are organized in a similar manner: a principal adopter VN (which has, as main company, the company who will decide to purchase the product) and multiple other adopter VNs (listed for reference). In this case, the stakeholders refer to companies who participate to the acquisition process or to the usage of

the product/service. Therefore they influence directly or indirectly the adopter acquisition behavior.

In the concrete forms, the main supplier, the most principal competitor and the principal adopter value networks are detailed

Between a supplier VN and an adopter VN, a supplier/adopter relation is represented. It represents the relations between the companies in the adopter VN and the companies in the supplier VN. It is detailed in the next Section.

Last, the form represents the segment regulators (e.g. governmental agencies, political groups) who control what happens in the segment.

By filling the segment definition form, the multi-disciplinary team agrees on who are the relevant actors in the competitive environment of the company and what are their roles.

2.3 Supplier / Adopter Relation

In order to understand the principal adopter's needs (together with its stakeholders) and the manner the supplier (together with its stakeholders) is fulfilling those needs, we analyze in details the relationship between both.

Figure 4 illustrates the Supplier/Adopter Relation Form. This form can be used to analyze either the relationship between the main supplier and the principal adopter or the relationship between the principal competing supplier and the principal adopter. This is useful for competitor analysis.

This form describes in details the product or service lifecycle (development of product/service, acquisition of product/service, and feedback on its usage, improvement of existing product and promotion of product/service to new adopters). The arrow illustrates the sequence of actions.
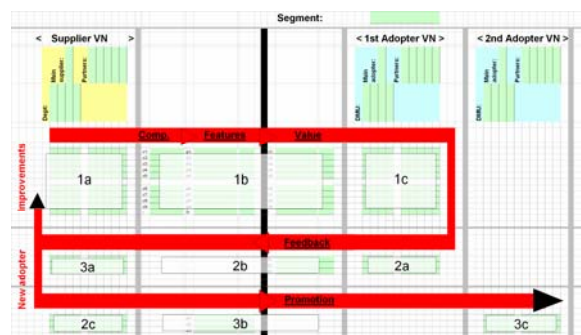

Figure 4: Overview of SAR Form

The main part of the form (located in 1b in Figure 4 and detailed in Figure 5) represents the value creation:

it formalizes how the "components" that compose the product are related to the product features and then how the product features relate to the values of the adopter. For example, an MP3 player can have a component which is a "hard disk of 60Gb"; this leads to the product feature "MP3 player with 60Gb of storage". This creates the value for the adopter "all your music with you on the road". The term component should be understood in a broad sense and should the product itself and its delivery (e.g. "availability of MP3 player in quantity"). The component might even cover product design if it is a service offered to the adopter.

Figure 5: Components to features to values mapping

Once the components are identified, a matrix maps those components to specific entities in the supplier value network (1a in Figure 4 and Figure 6). Within the main supplier's organization, various departments or business units are represented to specify their competences. The involvement of the main supplier's departments and of its stakeholders in creating the specific component is defined: an "R" means responsible and a "P" for participant.

Figure 6: Supplier-side responsibility matrix

In a similar way, the values are mapped to the different companies in the adopter value network (1c in Figure 4 and Figure 7). Within the main adopter's organization,

the members of the decision making unit (DMU) are represented together with their involvement in the decision (responsible ("R") or participant ("P")). The positive ("++", "+") or negative ("-", "--") perceptions of a specific value by the stakeholders is also represented.

Figure 7: Adopter-side responsibility matrix

The middle part of the form represents the feedback process from the adopter to the supplier. The form describes: who provide the feedback within the adopter value network (Fig. 4 2a), how is the feedback provided (Fig 4 2b) and who analyzes it within the supplier adopter network (Fig 4 2c).

From the analysis of the feedback, two courses of actions are taken: the existing product is improved and the feedback material is packaged to become promotion material for the next adopter. In that case, the form describes who generates the marketing material within the supplier value network (Fig. 4 3a), how is the marketing material provided (Fig 4 3b) and who benefits from it within the next adopter value network (Fig 4 3c).

In summary, the SAR form is useful to understand the value creation process and the product/service delivery/feedback/promotion. When SEAM in Business is used to specify an IT system, this is useful to understand what the actors in the business environment are expecting from the IT system. In particular: what information needs to be provided to the companies in the adopter value network and what information should be collected from them.

2.4 Method

Our practice shows that the best way to use SEAM in Business is with groups of people.

In an academic setting (typically post-graduate trainings), groups of 3-4 people work on a set of forms. On a regular basis, each group presents its forms to the other groups for review. A document camera is used, so no PCs are necessary. The presentation lasts between 3 and 7 minutes. Figure 8 shows a student presenting his forms to the class. This trains the participants to conceptualize their analysis, to present it and to review others' work.

In consulting, the approach is similar: the management works as a team in filling these forms. Sometimes, the forms are not even used and the diagrams are drawn from scratch by a consultant based on the discussions with the multi-disciplinary team.

Within a day a complete set of forms can be filled and analyzed. The detailed specifications (including content and structure) and the development of the web site can start based on the needs identified in the SEAM in Business analysis.
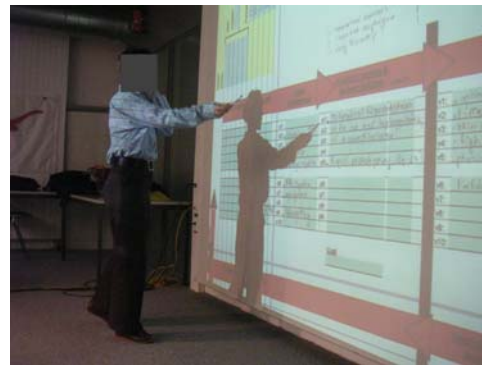

Figure 8: Photo of a student in an entrepreneurship class presenting a Supplier / Adopter Relationship Form.

2.5 Definition of the Requirements for the IT System

Once a SEAM in Business analysis is done, segments are identified and, in each segments, the stakeholders are known and categorized (e.g. main and competing suppliers, adopters, regulators). The exchange of information between the main supplier and all the companies in the environment is defined. This can drive the development of the IT system in two ways:

If the problem is to communicate with the companies in the environment of the supplier, the results given by SEAM in Business can drive the web site definition.

If the problem is to coordinate the business process of the companies, the SEAM analysis needs to be carried on within the companies. The role of the departments, people and IT system in the business

process needs to be modeled. This is illustrated in [Wegmann05] and SEAM in Enterprise Architecture is used for that purpose.

In the next Section, we present an example of SEAM in Business analysis that leads to the development of a web site.

3 Example: Web Site for an Association

In this Section, we present the SEAM in Business analysis for the SEAM Association. SEAM Association is the organization which promotes SEAM methodology. We list the segments in which the association is active. We detail one of them and analyze the corresponding supplier/adopter relation in that segment. The purpose of this analysis is to: identify the stakeholders, and to understand the needs of the companies in the principal adopter value network. From this, we can define the requirements for the development of a web site for the association.

3.1 World Definition

In the World Definition Form, we model the Business Methodology market (Figure 9). In this market, we identify four segments in which SEAM Association can be present: (1) Product Managers in Large Corporations, (2) Professors teaching Entrepreneurship, (3) Coaches for SME and (4) Coaches for startups. We focus on the "coaches for startups" segment.

Figure 9: World Definition Form for SEAM Association

3.2 Segment Definition

In this Section we analyze in details the segment "Coaches for startups" In this segment; the SEAM Association trains coaches on the method. It is one of the most important segments for the association.

In this Section we detail only the principal supplier value network and the adopter value network. The

complete Segment Definition Form is given in Appendix. We present first the adopter value network as it is often best to describe first who a company serves (adopter side) before describing in details how a company gets organized to run its operation (supplier side).
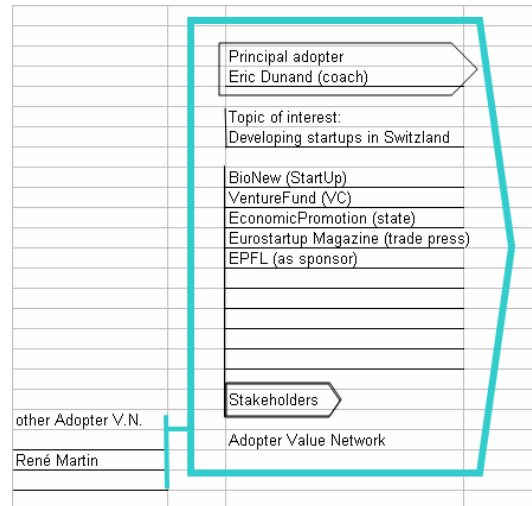
Figure 10: Principal Adopter Value Network in segment Coaches for startups

The adopter value network's topic of interest is the startup development The principal adopter is Mr. Eric Dunand who does coaching. When coaching, his interest to the SEAM methodology is directly or indirectly influenced by the companies (stakeholders) listed in Figure 10. BioNew is a startup that Mr. Dunand supports actively. The VentureFund is a venture capital company that has an interest to invest in BioNew. The Economic Promotion and the tradepress (Eurostartup Magazine) have the role to support and to inform startups. The EPFL University, as a sponsor, is interested to develop its brand and to be known in this market. Once Mr. Dunand has "bought" SEAM, the next target adopter will be Mr. René Martin.
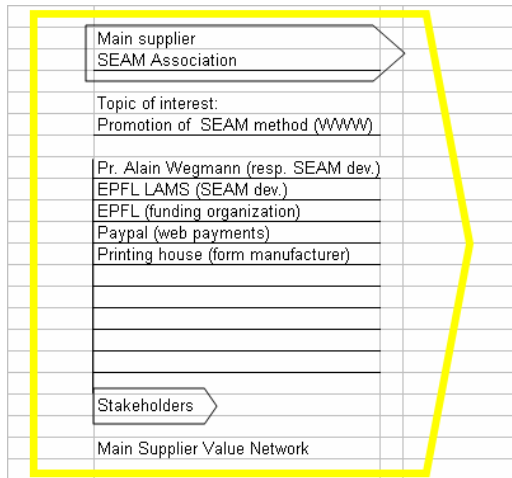
Figure 11: Main Supplier Value Network in segment
Coaches for startups

The value network of the SEAM Association is
described in the Figure 11. Its topic of interest is the
promotion of the SEAM method (in particular on the
WWW). Pr Alain Wegmann and its laboratory LAMS
at EPFL have developed the SEAM methodology and
are involved in the further development of the method.
The EPFL University, as funding organization,
contributes to some courses and events organization.
The adopters have the opportunity to buy, on the web,
pre-printed A3 forms delivered by Printing House and
invoiced through the on-line service of Paypal.

3.3   Supplier Adopter Relationship

The Supplier/Adopter Relationship form is useful to
understand the details of the exchanges between the
companies in the supplier value chain and the ones in
the adopter value chain. This analysis will give
detailed information on what the web site needs to
provide. In this Section, we present a subset of the
information represented in the form. A complete form
is given in the Appendix.

Figure 12: Adopter side responsibility matrix

Figure 12 shows the mapping of values created by the
use of the web site for the main adopter or its
stakeholders. To illustrate one value, the goal of the
SEAM Association is to provide a professional
training on SEAM methodology to coaches. For this
reason, the SEAM Association web site makes easy for
Mr. Dunand to plan its participation to the courses (v1
in Figure 12) to enhance its knowledge as coach (v2).
His competences will have a higher visibility (v8).
Such visibility might influence BioNew and
VentureFund positively ("++" in matrix in Figure 12)
when requesting consultancy advises.

Figure 13: Components to features to values mapping

The Figure 13 shows how the values are mapped to
features provided by SEAM Association and its
stakeholders and how these features correspond to
technical or non-technical components. For example,
knowledge improvement (v2 in Figure 13) is provided
through case studies (p2) available on-line for the
SEAM Association members. These case studies are

developed as part of SEAM development (c7). The delivery of case studies is done thanks to the component of secure payment (c10). Another example is the recognized knowledge (v7) provided through a list of accredited partner (p6), itself provided automatically by the web administration component (c8).

	Comitee	Content Manager	Planner	Finance Manager	Web master	Pr. Alain Wegmann	EPFL LAMS	EPFL (funding)	Paypal	Printing House		
	P	R		P							c1:	Content & Info
		P	R	P			P				c2:	Agenda
		R	P	P							c3:	Newsletters
		P		P	R				P		c4:	Online registration
		P			R						c5:	Intranet
		R		P							c6:	Forum and blog
	R			P	P						c7:	Development SEAM
		P		R			P				c8:	Web administration
	P	P	R		P				P		c9:	Accessories
			P	R					P		c10:	Secured payment

Figure 14: Supplier side responsibility matrix

The Figure 14 shows the mapping of responsibility within the SEAM Association and its stakeholders to provide components. For example, the organization of the agenda (c2 in Figure 14) is under the responsibility of the Planner in close collaboration with external partners such as EPFL. The Content Manager and the Web Master are also involved to maintain updated and detailed information about the activities listed in the web site. The Web Master is responsible to implementation of an online registration component (c4) using the Paypal mechanism in close collaboration with the Financial Manager and the Content Manager.

3.4 IT System Requirement

By filling the three forms described in this paper, the development team can get a thorough understanding of the competitive environment of the company and of the role of the IT System. The originality of the SEAM model is this mixture of concreteness (with real names of people and companies) together with a conceptual framework (captured in the form format). Another interesting aspect is the seamless transition from value to the adopter, to features provided by the supplier and to component to be provided by the supplier. Thanks to this link, it is possible to reason about the link between the value created for the adopters and the components of the IT system provided by the suppliers.

When making the specification of the web site, the developer needs to understand how what has been identified in the SEAM models is mapped into IT technology. In here is a possible analysis:

The web site should, in principle, provide differentiated access for the actors of the different segments. For example, a specific tab in a web site can be dedicated to each segment.

Adopters, as member of the association can have a personalized access to specific documents or to forums and blogs dedicated to SEAM Association's members. This access is provided as an extranet. It is typically password secured.

The feedback and improvement mechanisms can also benefit from the web site. For example, feedbacks from visitors and web statistics will lead to an enhancement of the web site structure and content.

At this point traditional methods to define user interface can be used.

4 Foundations and Validation

SEAM is in development since 1997, is used for teaching since 2000 and for consulting since 2004. SEAM exists in three domain–specific versions: SEAM in Business (considering markets, segments and companies), SEAM in Enterprise Architecture (considering company's organizations and business processes) [Wegmann05] and SEAM in Software (considering software components and programs) [Balabko05].

These three versions share a common approach to design systems which is defined in Pure SEAM. The originality of the SEAM approach is its combination of genericity and specificity. Its impact is the capability to reason on seamless integration between the different

views of a company. A CAD tool supporting pure SEAM is in development [Lê06].

4.1 SEAM Foundations

Pure SEAM is based in on a systemic paradigm [Banhaty01]. This systemic paradigm has three parts: a philosophy, a method/tool, and a set of theories. We present briefly these three parts. A more detailed description can be found in [Wegmann03].

The SEAM philosophy is based on: Constructivism [LeMoigne95] and the Tarski's theory of truth [Tarski44] - the enterprise model is a "social agreement" constructed by all participants. The Living System Theory [Miller95] - the enterprise model is hierarchal as proposed by Miller for any living system models. Miller did study systems ranging from cells up to social systems. The RM-ODP part 2 [ISO95] – the enterprise model is build within model elements that comply with the RM-ODP definitions. Example of model elements are "objects", "actions", "state".

The SEAM method is inspired by the principles of extreme programming (xP) [Beck99]: Models are developed by the teams to get collective ownership. Models are developed iteratively. Models are tested frequently with reviewers (e.g. domain specialists, customers). The SEAM tools to represent models can be software [Lê06] or can be simple Excel forms as presented in this paper.

The theories used in SEAM are general system thinking [Weinberg01] and are domain specific theories. These theories provide the heuristics necessary to take the design decisions. For example, SEAM in Business is largely inspired by the Porter's approach [Porter85]. More details are given in Section 5.

4.2 Validation

Since 2004, we teach SEAM in Business as described in this paper and since 2005 we use SEAM in Business to specify IT systems.

In post-graduate courses, students appreciate to work as groups on practical issues (tested on approx. 90 students). The debriefing at the end of the course is essential to make student realize the value of what they learn. Using the SEAM method in ex-cathedra courses is possible but brings less positive results (tested on approx. 150 students). The students have difficulties to relate to the method if they do not try to use it on a concrete problem. Problems addressed in ex-cathedra courses are not sufficient. Using SEAM on business plan project with undergraduate students is also effective (more than 40 groups of 2-3 students in 2 years).

In 2005, we made a formal study comparing SEAM in Business and the traditional methods (e.g. Porter value system). The opinion of 23 business leaders and consultants has been collected and statistically analyzed. Based on the statistical analysis, the main contribution of SEAM over individual methods is its ability to integrate, in a coherent whole, a lot of business-related theories that are, otherwise, unrelated. Its capability to represent segments and supplier/adopter relationships is also considered as an important contribution, especially as it enables to think in terms of relations between the different players.

We also collected feedbacks from web developers who appreciate the method as it enables them to capture what their customers expect. Web designer are often artists and a framework that guides their customers' interviews is a plus.

In summary, our findings show that SEAM in Business contributes to the identification of the company wide stakeholders and of their needs.

5 Related Work

The SEAM in Business method is closely related to the existing analysis method used in business. In particular, the Segment Definition Form is inspired from the Porter value system [Porter85]. SEAM in Business represents the value system as a set of value network and not as a linear chain of companies. The limitation that brings the linear value system is discussed in [Stabbel98]. The SAR form combines the responsibility matrix usually found in project planning, the mapping between feature and quality found in the house of quality [Hauser88] and the value to beneficiary matrix is more rarely found in the literature. The overall product lifecycle is inspired by ISO 9000 [ISO00]. Last, reasoning about the adoption process is discussed in details in [Ryans00]. In summary, the originality of SEAM in Business is to have put together all the above approaches in a coherent whole and to propose a systemic approach with a graphical model.

Other business-related approaches have a similar integration goal as SEAM in Business. For example, EBMF [Osterwalder02] provides a spreadsheet based approach based on the balance score card. E3Value provides a tool to analyze value and monetary exchanges between companies [vanDerRaadt05].

In RE, at least two methods have a relationship with SEAM in Business. The closes one if the onion model [Alexander04]. The different layers in the onion could be compared to the different levels of systems in

SEAM in Business. However, SEAM in Business uses a vocabulary slightly more specific (e.g. segment, value network). The methodology can also be related to the knowledge representation model of Volere [Robertson04].

6 Conclusions and Future Work

Developing IT systems that are aligned to business needs is a growing need. To achieve this goal, the IT developers need to have the tools to understand the competitive environment of the company who desires the IT system. Understanding the competitive environment requires to identify the stakeholders of the company and their needs.

We present in this paper SEAM in Business, a method for analyzing the competitive environment of a company. The result of the analysis consists in is supported by a set of forms: one world definition form (that lists all segments) and multiple segment definition forms (that identifies all stakeholders) and supplier/adopter relation forms (that identifies their values and the means to sastify them). One segement definition form and one supplier/adoper form are done for each important segment. In filling these forms, it is possible to identify the business requirements for the IT systems.

As future work, we plan to develop an electronic tool to support the SEAM in Business analysis. This will enable us to do the introduction of a quantitative analysis of the segments. This is useful to comparing the size and the maturity of the segments. Another benefit of the tool will be is to be able to link SEAM in Business with SEAM in Enterprise Architecture. It will then be possible to move seamlessly from the business analysis down to the business process analysis (and eventually to the software analysis).

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Appendix: Complete SVN & SAR Forms for the Example

(a) Segment Definition Form for the "SEAM Association" in the "Coaches for startup" segment

(b) Supplier / Adopter Relation Form for the "SEAM Association" in the "Coaches for startup" segment