Albert Fleischmann
Werner Schmidt
Christian Stary *Editors*

S-BPM in the Wild

Practical Value Creation

Springer Open

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Preface

While S-BPM has received attention and acceptance in the research and innovative development community, its reception and uptake in business practice and organizational development is still a challenge for management and operation. Several case studies have been provided in the annual S-BPM ONE events, in order to demonstrate capabilities and implementation approaches. We follow this tradition by providing a dedicated volume with recent field studies.

Targeting developers, educators, and practitioners, we have structured the latest key methodological and technological S-BPM developments in training, research, and application. They have been carefully selected and thoroughly peer-reviewed by at least three experts in the field.

We need to thank all relevant people for their active engagement facilitating the editing of this book, in particular

- the authors of the various contributions sharing their expertise in a narrative way,
- the reviewers reflecting on each of the contributions thoroughly, and
- the European Commission funding this IANES[1] outreach activity.

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Introduction

1

Albert Fleischmann, Werner Schmidt and Christian Stary

Subject orientation, as introduced in (Fleischmann et al. 2012), aims for contextual design of socio-economic and socio-technical systems primarily from an interaction perspective. The S-BPM (Subject-oriented Business Process Management) modeling language reflects the trend towards semantic specification and processing. Although S-BPM is a domain-independent approach, each application is case-sensitive, even when validated models can be executed automatically, thus enabling seamless roundtrip engineering. Infrastructures, in terms of both organizational and technical characteristics, such as project-like organization of work, service-oriented architectures and cloud computing, need to be integrated along each life cycle.

While traditional approaches to modeling are mainly driven by functional and hierarchical decomposition of value chains, S-BPM considers behavior primarily emerging from the interaction between active system elements termed subjects, based on behaviors encapsulated within the individual subjects. Particular bundles of activities and their iterations enable adapted or novel organizational behavior, becoming manifest in the various levels of organizational development. Each level corresponds to a certain level of organizational maturity, and can be achieved either

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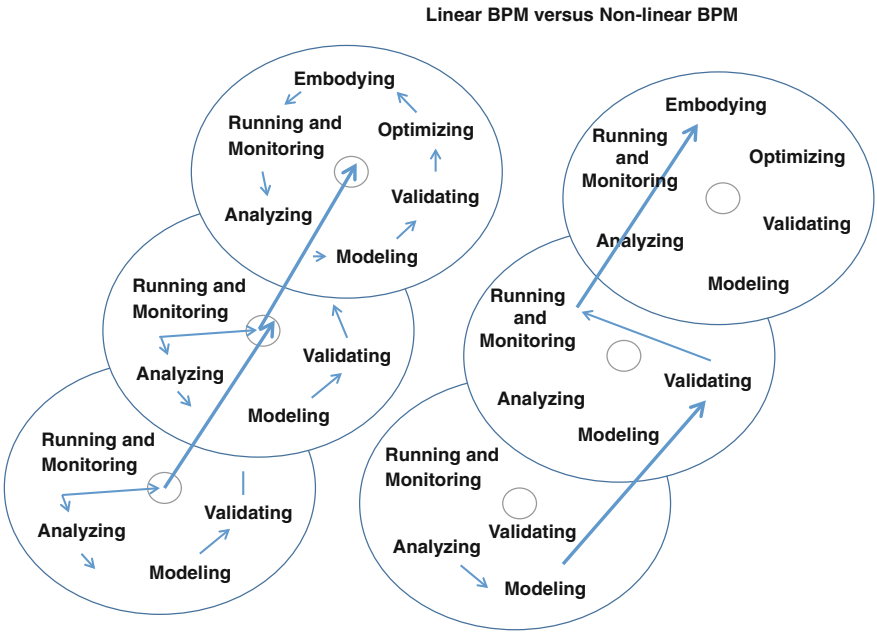

Fig. 1.1 Patterns of organizational development driven by S-BPM

in a linear or a non-linear sequence of S-BPM activity bundles, as indicated in Fig. 1.1.

Linear development (left part of the figure) corresponds to traditional life cycle approaches to Business Process Management (BPM) (cf. Weske 2012): In order to complete a phase each activity has to be executed, and needs to be completed at least one time before entering the next life cycle (i.e., the next level in development), even when there are cyclic activities within each life cycle, such as modeling and validating models several times. The transition to the next BPM step is traditionally defined by reaching a dedicated bundle of activities, mainly running and monitoring. It allows observing running a business after modeling and embodying processes into the operation, and before analyzing the effect of implemented process changes. It corresponds to entering already the next BPM cycle, as indicated when following the bold directed link to the upper level in the figure.

In the *non-linear S-BPM approach* (right part of the figure) reaching the next step of organizational development is characterized by being able to switch to a higher stage of development (displayed as the upper layer) from each of the activities, as indicated in the figure through the bold directed arcs. The most typical example is changing individual functional behavior while keeping the interaction interface to other subjects. It allows improving the individual organization of work on the fly.

However, its effects become evident on the organizational level through monitoring the concerned subject's behavior in its operative context. Since this

emergence of organizational behavior resulting from individual functional behavior modification can be driven by several subjects, the results need to be evaluated (monitoring and analyzing) on another level of organizational development than the one where the changes actually occurred. The more an execution engine is intertwined with the activities of the life cycle, the more can direct effects of changes be experienced and the more likely stakeholder changes lead to the next level of organizational development. It accelerates organizational development.

When handling the S-BPM life cycle in a non-linear way, modeling has to be considered one of the core activities, as models may serve as focal points for improvements or for changes of the communication behavior before becoming effective on the operational level. In S-BPM the organizational and subject-specific levels and their interfaces are addressed in a consistent way. An organization is represented in terms of interacting subjects specified in the S-BPM Interaction Diagram. Outcome is generated through the exchange of business objects that are processed by functions. Functions are performed by the involved subjects, and are specified in the S-BPM Behavior Diagram.

In this way, S-BPM captures all essential aspects of BPM, namely the Who, the What, the How, and the When. However, it is the communication-oriented way of specifying organizational and stakeholder behavior that ensures coherence and reducing complexity in change management. Hence, there are several ways of applying S-BPM. Field studies, such as qualitative descriptive reporting, have turned out useful for demonstrating the practicability of novel paradigms and the state of affairs in the field (cf. Senge et al. 1994). A field study is generically a story. It presents the concrete narrative detail of actual events. It has a plot, an exposition, characters, and sometimes even dialogue. Each study focuses on an essential issue, such as capturing exception handling in business through extending subject behavior diagrams with non-routine behavior, as it is not only a description, but also an analysis.

The authors of a case explain step-by-step how the story develops, and give readers context in each step for the explanation and conclusion drawn. This contextualization also relates the happenings to the concepts or theories of S-BPM, in particular how a certain framework, procedure, concept or feature can drive or drives a case. Besides capturing the processes of data collection and analysis, interventions or disruptions are listed, along with a strong attempt to make connections between the data and the analysis (conclusions) evident. Since field studies tend to be exploratory, most end with implications for further study. Here, significant variables are identified that emerged in the course of the study, and lead to suggesting S-BPM novelties. Implications for contextual factors, such as skills of project participants, are helpful for conveying a complete picture of the case.

The field studies could be clustered according to three main S-BPM themes:

- *Business Operation Support* documents approaches to the practical development of S-BPM solutions in various application domains and organizational settings.
- *Consultancy and Education Support* provides cases helping to train S-BPM modeling and knowledge acquisition for S-BPM life cycle iterations. It also

refers to architecting S-BPM solutions for application cases based on experience knowledge.
- *Technical Execution Support* comprises concepts for utilizing specific theories and technologies for executing S-BPM models. It also refers to building reference models for certain settings in the field.

In part I, *Business Operation Support*, in five field studies S-BPM support is addressed from practical cases, ranging from value-driven and strategic development to implementing subject-oriented workflows.

- Matthias Lederer et al. report on interfacing strategic management with subject-oriented processes in manufacturing. They demonstrate how strategic objectives of an organization can be put in relation to operational S-BPM models, namely using novel developed Strategy Process Matrices.
- Augl et al. demonstrate how to integrate S-BPM into organizational development, in terms of acquiring work knowledge and bringing it to operation via S-BPM models. They introduce Value Network Analysis as an intermediate representation and processing technique for effective change.
- Sprogies et al. tell the story of how an IT service provider managed to establish agile, flexible and transparent processes to meet customer needs. They address the software deployment process as part of application lifecycle management by following the various bundles of the S-BPM life cycle up to executing and monitoring S-BPM models.
- Lothar Hübner documents how employees in the business departments can be qualified to compile large and complex processes exemplifying the introduction of an IT hardware service process. Besides the technical feasibility, the economic impact of approaching such projects by S-BPM is demonstrated.
- Frank Lorbacher's narrative concerns the design of an IT information architecture while taking into account an existing customer's infrastructure. In the field study business processes could be consistently propagated to Enterprise Resource Planning (ERP) functions for contract performance. Besides increasing flexibility in process design, the time for billing cycles could be reduced, which in turn influences worker satisfaction positively.

In part II, *Consultancy and Education Support*, six field studies provide conceptual inputs to design S-BPM projects, and utilize tools supporting modeling intuitively, and thus, education on the fly.

- Harman et al. demonstrate how accurate process model elicitation can be achieved while minimizing the effort of recognizing information items and specifying processes. When walking through a 3D Virtual World relevant information is marked and tagged to become part of S-BPM models. The proof of concept has been evaluated involving S-BPM tool developers.

- Fleischmann's field study concerns the usefulness and usability of the S-BPM Buildbook. This modeling device is intended to be utilized by modeling novices due to its intuitive design—it provides 3D notational elements and 3D specification support. Once a minimal set of rules is followed, consistent models can be constructed and processed for execution. Several process surveys could be completed successfully using this device.
- Christoph Piller's case addresses the effectiveness of maintenance in production. Guided by the Total Productive Management method for unplanned maintenance tasks, he created a reference model for the corresponding business process. It is available in the S-BPM notation and can be customized for different application domains.
- Thomas Schaller et al. tackled role and right management in business process management through S-BPM. Enriching S-BPM with role and right management leads to highly contextualized process designs.
- Singer et al. combine S-BPM with modeling and implementing business rules. They enhance the agility of workflows by incorporating decision making procedures. Using such transparent representations and coupling a rule engine to S-BPM runtime tools, the transformation of a business towards a digital organization becomes more context-sensitive and straightforward.
- Udo Kannengießer describes a manufacturing scenario along a developers' dialog, when agents are used for implementing subject-oriented process models. Using computational agent technology requires specific mappings of subjects to agents, and dedicated control mechanisms when executing subject behavior.

In part III, *Technical Execution Support*, three field studies provide insights into implementation requirements, taking an execution perspective on processes while recognizing technological and/or organizational particularities.

- Harald Lerchner reminds us about the benefits of a precise semantic specification in BPM, as semantic ambiguities encoded in process models could result in unintended organizational effects throughout execution. Exploring the capabilities of Abstract State Machines, S-BPM models can be interpreted in terms of both their semantic precision and their automated execution. The developed workflow engine serves as baseline and reference implementation for further language and processing developments.
- Singer et al. report on testing Microsoft technologies and reflect on a platform for modeling and executing business processes as interaction between actors. For networking organizations the technology serves as a multi-enterprise business process platform using cloud technology.
- Max Dirndorfer's field study supports organizations which intend to execute S-BPM processes while running a standard ERP system. His story reveals not only a strategy on how to tackle the implementation of an organization's work practice in S-BPM based on ERP system features, but also reports on setting up and running the corresponding change management projects.

From a methodological perspective, most of the authors followed a non-personal style of presenting their stories, while two of them decided to present their case in a dialog format, aiming to reach even the non-technical audience with implementation-relevant S-BPM issues.

Table 1.1 reflects the richness of stories when looking at the provided narratives from different perspectives. It contains all field studies clustered according to their type of core support, thus ranging from Business Operation to Technical Execution Support. The categories in the top row of the table allow a more detailed consideration of each contribution:

- *Application Domains* reveal in what type of industry or area of work practice the field study stems from or can be applied.
- *System Architecture/Tool Chain Issues* refer to system components and their interactions that turn out to be relevant when implementing communication-oriented BPM.
- *S-BPM Life Cycle Bundles* provide insight into the scope of (S-)BPM activities that have been tackled in the field study.
- *Methodological Developments* revisit each contribution in terms of methods that fit the various cornerstones of the S-BPM methodology.
- *Organizational Relevance* indicates for practitioners the significance of each field study to organizational development and change management.

Looking at the table, several patterns can be recognized on a first glance, leading to some reading recommendations once readers prefer certain semantic access routes to the field studies:

- S-BPM has been applied successfully in the service and production industries. It seems to scale quite well for networking and bootstrapping.
- Legacy systems, such as Enterprise Resource Planning systems, can be addressed in a variety of strategic and technical ways. Hence, S-BPM is not a radical re-engineering approach. It rather can be aligned with existing infrastructures and implementation approaches.
- Only few findings exist referring to the economic impact of S-BPM, although its potential is revealed through constructive stakeholder engagement.
- The prominent role of modeling becomes evident when looking to the addressed bundles of the life cycle and the baseline serving for acquisition (analysis) and (direct) execution.
- Methodologically, pre-processing knowledge seems to be of vital interest, either approached on the strategic level or addressed in the analysis or modeling phase.

Table 1.1 (**a**) Business operation support, (**b**) consultancy and education support, (**c**) technical execution support

Chapter	Field of interest				
	Application domains	System architecture/ tool chain issues	S-BPM life cycle bundles	Methodological developments	Organizational relevance
(**a**)					
2 Lederer et al.	Customer service product development manufacturing	Organizational networking	(Strategic) optimization monitoring	Strategy process matrix	Strategic management → operation
3 Augl et al.	Health care clinics		Analysis modeling optimization	Value network analysis for elicitation and pre-processing	Value-driven process management
4 Sprogies et al.	IT service provision SW-deployment		Analysis → execution	Subject-oriented application lifecycle management	Process flexibility
5 Hübner	IT hardware service provision	ERP database integration	Modeling execution	S-BPM driven data management	Effectivity gains
6 Lorbacher	Service provision	Process layer on top of ERP system	Modeling → execution	Separating business logic from data management	Shifting from ERP- to workflow management

(continued)

Table 1.1 (continued)

Chapter	Field of interest				
	Application domains	System architecture/ tool chain issues	S-BPM life cycle bundles	Methodological developments	Organizational relevance
(**b**)					
7 Harman et al.	Human resource management	Articulation front end to S-BPM modeling and execution tools	Integrated analysis and modeling	3D virtual world elicitation of S-BPM-relevant process information	Immediate, since walk-along/ through workplace elicitation of process knowledge
8 Fleischmann	Manufacturing service industry	3D S-BPM modeling front end to execution tool	Analysis → modeling	Tangible subject-oriented structure elaboration	Easy-to-grasp (stakeholder-centered) individual work knowledge elicitation
9 Piller	Production—maintenance of equipment	Reference model	Modeling	Total productive management reference model	Lean management best practice representation
10 Schaller et al.	Service processes (HR, claims processing)	Role representation server for organizational implementation	Modeling organizational implementation	Embodying traditional organization models	Role/access rights management
11 Singer et al.	Logistics	StrlCT windows reference architecture for implementation BizTalk rule engine access for subject's function states	BizTalk rule modeling → implementation	Business rule representation and S-BPM Integration	Transparency of decision making business rule management
12 Kannengießer	Manufacturing	Agent-based execution of subject behavior	Modeling → execution	Assigning agents to subjects for technical implementation	Shopfloor operation management

(continued)

Table 1.1 (continued)

Chapter	Field of interest				
	Application domains	System architecture/ tool chain issues	S-BPM life cycle bundles	Methodological developments	Organizational relevance
(**c**)					
13 Lerchner	Manufacturing	Model interpreter execution	Model transformation for execution	Semantic specification of S-BPM models	Semantic understanding of S-BPM models
14 Singer et al.	Manufacturing	Open vendor-specific execution utilizing cloud	Modeling → execution	Multi-enterprise process platform	Cloud-based execution of processes
15 Dirndorfer	Customer request handling	ERP integration via enterprise service bus, API, web service protocol	Modeling → execution	ERP-integration strategy for business processes (mapping ERP functions to S-BPM business objects)	Implementation follows IT strategy embracing ERP connectivity

Based on these findings the following chapter lists could serve as a quick reference for readers who want to jump to stories motivated by one of the topics listed:
S-BPM Methodology:

- For starters: 4, 7, 8, Appendix
- For experienced: 2, 3, 5, 6, 9–15
- For switchers from other approaches and transformers to S-BPM: 2–8, 10, 11, 12, 14, 15

S-BPM Application:

- Process industry: 2, 8, 9, 12, 13, 14
- Service industry: 2, 3, 4, 5, 6, 7, 8, 10, 11, 15
- Hybrid industry: 2, 8
- Non-profit organizations: 3

S-BPM Education and Capacity Development:

- Study programs: 2, 3, 4, 7, 8, 9, 15
- Learning environments: 4, 7, 8, 13
- Paradigmatic and systems thinking: 2, 3, 4, 5, 6, 8, 10, 12

S-BPM Technology Highlights:

- Processing environments: 4, 5, 6, 7, 8, 10, 11, 13, 14, 15
- Conceptual and/or algorithmic breakthroughs: 6, 7, 8, 10, 11, 12

Finally, the Appendix provides all relevant aspects for grasping S-BPM modeling and applying it based on fundamental examples. Its presentation format aims to balance semantic precision and syntactic rigor. However, it should suit the needs of both novices and experienced practitioners.

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Part I
Business Operation Support

Subject-Oriented Business Processes Meet Strategic Management: Two Case Studies from the Manufacturing Industry

2

Matthias Lederer, Peter Schott and Matthias Kurz

Abstract

Successful companies use business processes for the transfer of long-term strategies in operational workflows. The modeling approach presented in this chapter shows how strategic objectives of a company can be combined with the S-BPM modeling notation. The new modeling approach is used in two case studies. First, redesign rules for the strategic optimization of workflow models are demonstrated in the case of the customer support processes of an international enterprise. A second case study introduces a company-wide monitoring system through the example of the product development process of a multinational company from Germany.

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2.1 Motivation

"How beautiful the strategy, you should occasionally look at the results".[1]

This statement suggests that strategies need an adequate implementation and measurable results in order to become alive. Successful companies know how to operationalize sustainable strategies, which means to translate long-term goals into daily business (Wolf and Harmon 2012). Business processes are a core way for organizations to operationalize strategic objectives in workflows (Mintzberg 1994). However, studies show that process managers are struggling with making this critical transfer (Minonne and Turner 2012; Sidorova and Isik 2010).

The two companies serving as case studies in this chapter were confronted with this problem in two different stages of the BPM lifecycle. The first manufacturing company needed an approach to *redesign customer support processes strategically*. In the second case, a control system was needed that allows checking *whether innovation strategies were implemented in product development processes* modeled in S-BPM. These two situations are typical challenges of companies because strategic objectives (e.g., increasing customer satisfaction, minimization of time to market, etc.) are often not systematically taken into account during typical BPM activities (Hörschgen 2001). There are two basic aspects for incorporating strategy in business processes (Petzmann et al. 2007):

- First, strategic guidelines need to be incorporated in the *process models*. This implies that process models need to be designed so that they can implement strategic objectives when they are executed. If, for example, the strategic goal in the first case study is to increase customer satisfaction by fast issue handling, the S-BPM model should include elements (e.g., activities or documents) which are suitable to achieve this goal (e.g., forwarding scenarios and role models if a decision maker is not working fast enough).
- Second, once the models are aligned, the achievements of strategic objectives need to be managed in everyday business. That means monitoring and controlling *process instances*. This way, process owners can check if workflows follow the strategy. In the second example, a suitable control system should answer the question of whether development projects are forcing the strategic objective of increasing technology push innovations.

In this context and as well as in the two scenarios, the S-BPM approach focuses on one of the most essential factors for strategy implementation (Outram 2014): humans. Studies show that the consideration of human factors such as communication and understanding (Mair 2002), compliant leadership (Weber and Schäffer 2000) as well as motivation (Richardson 2004) for strategic long-term issues are

[1]Winston Churchill, British politician (1874–1965).

essential for the uptake and implementation of strategic objectives. In customer support processes, requests are processed better the more accurately employees understand the objectives behind the procedures.

The modeling approach by Lederer et al. (2014a, b) shows how strategies and S-BPM models can be integrated in a communicable diagram. This *Strategy Process Matrix* is used in this chapter as a basis (Sect. 2.2). Two approaches were developed in real-case scenarios to increase the degree of strategy orientation both in S-BPM models (Sect. 2.3) as well as in *process instances* (Sect. 2.4).

In a nutshell, this contribution complements the well-known and comprehensive approaches, methods, and IT applications which exist for S-BPM by integrating principles of strategic management in the subject-orientated thinking.

2.2 Strategy-Oriented Business Process Modeling[2]

The strategy-oriented business process modeling (SOBPM) approach provides both a method and a notation for linking process models with strategy. The approach combines strategic targets (*strategy*) with the workflow of a *business process*. The resulting *Strategy Process Matrix* realizes the essential basis for the case studies.

2.2.1 Strategy Map

The Balanced Scorecard (BSc) is a widely used (Chen and Jones 2009) standard tool in business practice (Chavan 2009). It groups an organization's strategic objectives in four perspectives. A Strategy Map (Quezada et al. 2009) depicts these objectives along with their dependencies using causal chains (Kaplan and Norton 1996). While the four perspectives of the BSc ensure a holistic view on the objectives (Quezada et al. 2009), the Strategy Map assists in interpreting the dependencies between objectives.

Section 2.3 shows how to combine Strategy Maps and S-BPM business process models using the Strategy Process Matrix. In the SOBPM approach, this combination requires two adjustments. First, the customer perspective of the BSc is generalized into the *stakeholder perspective*. That way, objectives can be assigned to all internal and external stakeholders of a business process (e.g., internal customers as well as external organizations). Second, entries in the Strategy Map need to be modeled on *unique vertical levels*. This means that each row of the Strategy Map contains only one objective.

[2]Substantial parts of the modeling approach documentation are taken from Lederer et al. (2014a, b).

2.2.2 Business Process Model

There are numerous possibilities for the formal as well as semi-formal representation of business processes. The SOBPM approach was originally developed by using BPMN but case studies and applications (e.g., see Sects. 2.3 and 2.4) show that both Subject Behavior (SBD) and Subject Interaction Diagrams (SID) can be used for visualizing business process in the SOBPM approach. In any case, regardless of the chosen process notation, one adjustment is necessary: To later ensure an easy-to-understand layout of the Strategy Process Matrix, each *flow object* contributing to one or more strategic objectives needs to be designed horizontally on a unique level in the model. This means that no flow node may be placed below another flow node. Flow objects are understood as nodes which have the potential to execute a strategy (e.g., activities, messages, tasks). If there are parallel sequence flows with relevant nodes, one of the flow nodes must be moved to the right.

2.2.3 Strategy Process Matrix

The graphical connection between strategic objectives and the process flow creates the *Strategy Process Matrix* (see Fig. 2.1): The matrix combines each objective of the Strategy Map (lines) with flow objects of the process flow (rows).

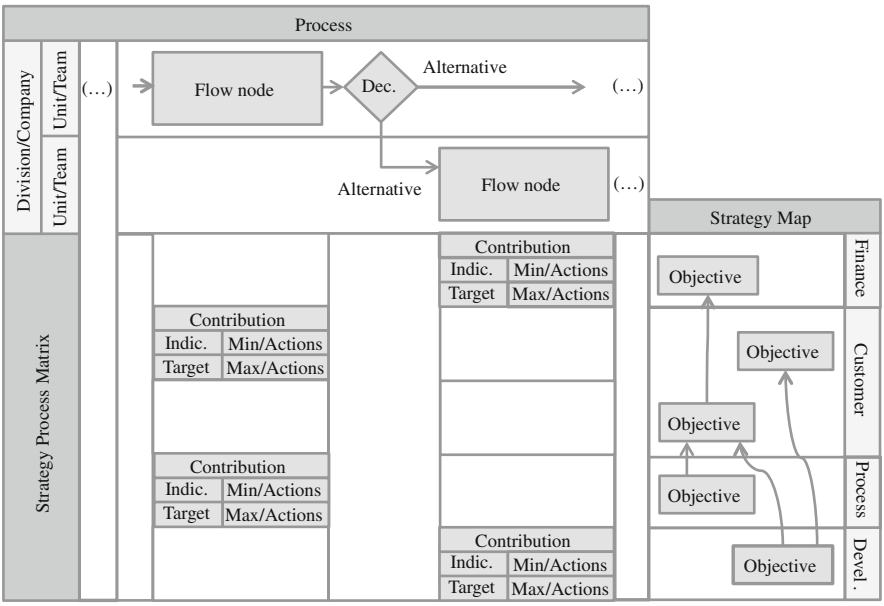

Fig. 2.1 Structure of the matrix (Lederer et al. 2015)

The Strategy Process Matrix essentially is a table. This table's columns are defined by the flow objects of the process model. Correspondingly, the table's rows are the strategic objectives of the Strategy Map. Each flow object (perhaps enriched by modeling elements like databases or documents if BPMN is used) may be assigned to one or more objectives. If multiple flow objects support the achievement of an objective, several fields of the matrix may contain information in the same row. Within each matrix field, the following four pieces of information should be documented: (1) *Contribution* (How does a flow object support strategy achievement?), (2) *indicator* (Which event, status or quantitative performance indicator can measure the contribution?), (3) *target* (What is the target value for the indicator and what deviations are acceptable?), (4) *min/max action* (What actions should be taken if the indicator cannot meet the target value?).

In the case of *Subject Behavior Diagrams* (SBD), function states of the process model are assigned to a unique horizontal place, because they contribute to the achievements of strategic targets. Since transitions present only the change of states and sending as well as receiving states are not able to execute strategic intentions of an organization, they are not modeled in unique columns. Figure 2.2 shows the illustrative and modified excerpt of a Strategy Process Matrix using an SBD from a case study from the automotive industry: The process of transferring recorded data to internal (e.g., legal department) and external (e.g., suppliers and other partners) stakeholders strives for increasing profitability which includes improved stakeholder relations. Moreover, the process has to follow external regulations, such as compliance standards which require a highly skilled process team. Also, the business process needs to increase the quality of data. The process workflow describes a data request from an external partner sent to an internal clerk from the data management team. This skilled worker receives the data request and decides,

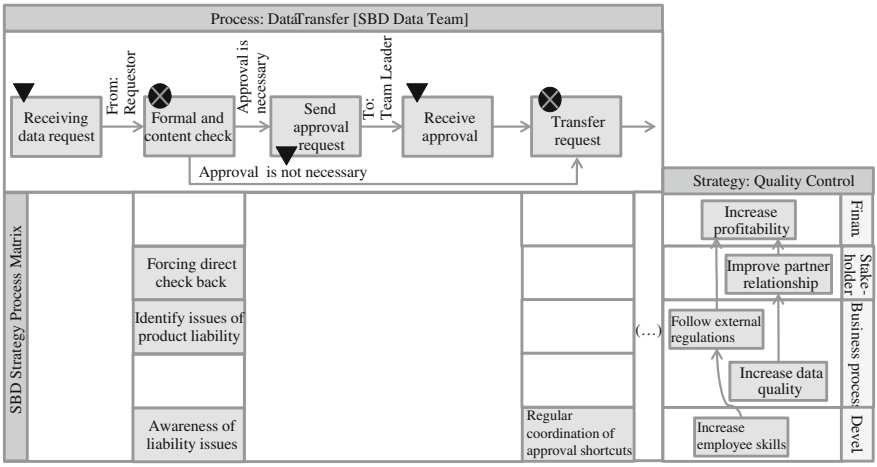

Fig. 2.2 Extract of a subject behavior matrix (Lederer et al. 2015)