Organizational Patterns for B2B Environments – Validation and Comparison

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Abstract. This research captures best practices in the business-to-business (B2B) domain as a means of competitive advantage and innovation for organizations striving to adopt B2B environments. We present a case of developing and validating a set of patterns for B2B adoption and then discuss the case in the context of a number of other cases where organizational patterns have been used to capture, document and share competitive organizational knowledge.

Keywords: Organizational patterns, pattern validation, business-to-business (B2B).

1 Introduction

Organizational success depends on capturing and using its knowledge, which may come in many different forms such as employee competence, skills, work experiences, and work procedures. Best practices and collective expertise are particularly important to capture and share in the most efficient ways, because they are the most valuable assets for sustainable competitive advantage, innovation, and success of many IT undertakings. One such area is establishing and running business to business (B2B) environments.

Organizations having B2B environments encounter many knowledge-related problems, for instance, the operation and communication aspects of the B2B environment, problems with accessibility and execution of transactions, lack proper documentation. Furthermore, employees' tasks are shifted frequently and new staff are added or replaced often without knowledge capturing and sharing. As the body of knowledge has grown considerably, it has become very difficult to fast track new employees and to externalize and share valuable knowledge quickly. Since most of this knowledge is problem-solution based, an effective and practicable way of addressing this challenge is to capture the knowledge in the form of patterns.

The objective of this paper is to present a case of developing and validating a set of patterns for B2B adoption and then to discuss it in comparison with a number of other cases where organizational patterns have been used to capture, document, and share competitive organizational knowledge. More specifically, we discuss pattern validation results in terms of the usefulness of the knowledge embedded in the patterns and the usefulness and appropriateness of the pattern format to knowledge capture.

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The rest of the paper is structured as follows. Section 2 presents the background of organizational patterns and introduces the pattern validation process. This is followed by the pattern language of B2B adoption in section 3. In section 4 we present the pattern validation results and discussion. This is divided into three subsections addressing the usefulness of the knowledge embedded in the patterns, the usefulness of the pattern format followed by a comparison with similar pattern development and application cases. Future work and concluding remarks are presented in sections 5.

2 Background to Organizational Patterns

A pattern is used to: "*describe a problem that occurs over and over again in our environment, and then describes the core of the solution to that problem in such a way that you can use this solution a million times over, without ever doing it the same way twice"* [1]. This principle of describing a reusable solution to a recurrent problem in a context has been adopted in various domains such as software engineering, information system analysis and design (e.g. [2]) and organizational design. Organizational patterns have proven to be a useful way for the purpose of documenting, representing, and sharing best practices (c.f. [3] & [4]). Patterns offer an alternative and flexible approach that bridges between theory, empirical evidence and experience, and help resolve practical problems of organizations. Knowledge sharing and the generic nature of patterns, provides an efficient instrument for capturing various knowledge chunks such as best practices, work processes, organizational solutions, experiences, etc. [5].

Organizational patterns show when and how to solve something [6]. To do this the pattern will have different elements as shown in figure 1. The elements of the pattern allow the potential pattern user to make a judgment as to the pattern's usefulness, appropriateness, and applicability in different contexts. In the B2B adoption case reported in this paper we have used the following fields – (1) pattern name as the general area of application, (2) business problem as the summary of the issue that the pattern intends to solve, (3) proposed solution to the business problem, and (4) motivation explaining the reason for the pattern, emphasizing the practical significance and implications of the pattern. When appropriate the solution is illustrated by a model fragment or referenced to business process descriptions. It is also worth pointing out that in some cases the knowledge embedded in the patterns serves only as a suggestion or inspiration for designing processes in organizations – the proposed solution would have to be

Name of field	Description
Name	Each pattern should have a name that reflects the problem/solution that it addresses. Names of patterns are also used for indexing purposes.
Problem	Describes the issues that the pattern wishes to address within the given context and forces.
Solution	Describes how to solve the problem and to achieve the desired result. Solution describes the work needed. It can be expressed in natural language, drawings, multimedia sequences, etc. Solution can be backed up with references to other knowledge sources and other patterns.
Motivation	Argument and example of applicable areas. In some cases this field also includes citations of expert interviews from the pattern discovery and development stages.

Fig. 1. The pattern template used in the B2B adoption case

Sources of knowledge for eliciting candidate patterns included business documentations (manuals, repositories and intranet), policies, rules, archival sources like project reports, as well as face to face and phone interviews with experts. Examples of the companies that contributed to this process are:

- a firm that solves complex systems integration issues behind state-of-the-art technology partnering with software vendors such as Sterling Commerce, and Business Objects.
- a data exchange company that enables B2B document exchange. It provides a B2B platform with a large number of suppliers, with which, buyers do business often exchanging hundreds or thousands of documents monthly.
- a large multi-service provider (Internet, data, multimedia, and voice),
- and a large wireless service provider.

2.1 Pattern Validation

Part of the process of developing patterns is validating patterns. I.e. the patterns development team needs to assess the reuse potential of the proposed patterns outside the organizational context in which they were developed. The validation process should be performed after a fairly complete and coherent set of patterns has been developed and it shows the external consistency of the knowledge embedded in developing the patterns. Patterns can be evaluated separately and in groups.

The ELEKTRA project developed a pattern evaluation approach [7, 8] that has been tailored and used in a number of subsequent projects. The approach puts forward a number of hypotheses and then validates them with a set of criteria addressed by questionnaires. The questionnaires should be answered by experts who have substantial competence in the respective knowledge domain and who could be seen as the potential pattern users. The ELEKTRA approach to evaluating the usefulness of the knowledge embedded in patterns used the following criteria:

– *Usefulness*: The degree to which the usage of the pattern would provide a substantial contribution in the context of a real problem-solving application.
– *Relevance*: The degree to which a pattern addresses a significant problem in the target industry sector or knowledge domain.
– *Usability*: The degree to which the pattern can be used in the context of a real application.
– *Adaptability*: The degree to which the solution advocated by the pattern can be modified to reflect a particular situation.
– *Adoptability*: The degree of acceptance of the pattern to be used by domain experts for resolving a particular problem of interest.
– *Completeness*: The degree to which a pattern offers a comprehensive and complete view of the problem under consideration and of the proposed solution.
– *Coherence*: The degree to which the pattern constitutes a coherent unit including correct relationships with other patterns.
– *Consistency*: The degree to which the pattern conforms to existing knowledge and vocabulary used in the target industry sector or knowledge domain.

- *Prescriptiveness*: The degree to which the pattern offers a concrete and tangible proposal for solving a problem, in particular with respect to the steps necessary for its implementation as described in the guideline.
- *Granularity*: The level of detail at which the pattern addresses a problem.

3 Pattern Language of B2B Adoption

The overall problem that the pattern language for B2B adoption addresses on the macro level is the lack of standards and structure in the operation and communication of the B2B environment, for example, issues in accessibility and execution of B2B transactions. Table 1 shows the different problems and corresponding patterns.

The goal of constructing a pattern language is to understand the dependencies among patterns and how they contribute to the overall problem of the pattern language. This required us to analyze the B2B environment and business operations. The current set of 25 patterns act as guidelines for B2B transactions. The patterns represent a set of problems that are involved in B2B systems transactions and each pattern's solution and its effect are supported by trading partner experience. The pattern as best practice action provides a means for what organizations need to do in order to compete effectively in a changing and competitive business climate.

Table 1. Problems and corresponding patterns and relationships

Business Problem	No.	Pattern Name	Relationship to patterns
X1:-The problem is dealing with different releases	P16	Versioning and compatibility	P1,P5,P22
X2:-Lack of intervention on errors raises issues	P1	Error handling/management	P10,P12,P24
X3:-Lack of agreed conventions	P3	Single platform	P4,P7
X4:-Set up issues with trading partners	P15	Connectivity	P17,P22
X5:-Multiple entry points	P9	Duplication	P2,P23
X6:-Visibility and monitoring in transaction systems	P8	Visibility and monitoring	P10,P12,P14
X7:-Non-relational tracking mechanism for issues	P24	Tracking and trending	P1,P8,P10
X8:-Documents fail to load because of process	P20	System, process/task failure	P10,P11,P21
X9:-No dialogue across the B2B modules	P5	Architecture/integration	P3,P4
X10:-No automated mechanism for various subtasks	P19	Auto task assignments	P2,P5
X11:-Data problems in disparate locations	P4	Centralized data repository	P3,P7
X12:-Transaction document accuracy	P17	Transaction integrity	P3,P4,P18
X13:-Lack of clear legal environment,	P11	Contractual issues	P3,P7,P12
X14:-Timely receipt and sequence of all files	P14	Timing and sequence	P1,P2,P16
X15:-Frequency and format of archived information	P25	Archiving and/or maintenance	P22,P23
X16:-Change process to support B2B initiatives	P2	Change management	P14,P18
X17:-Complicated B2B tools	P6	Usability/end-user enhancements	P2,P20
X18:- Collectivity in creating networks	P7	Inter-organizational factors	P3,P4,P5
X19:-Processing problematic transactions	P10	Resolution and reconciliation	P1,P24
X20:-Reporting mechanism for transaction activity	P12	Reporting capabilities	P1,P8,P19
X21:-File resends and corresponding enhancements	P13	File resends / re-load option	P1,P17,P23
X22:-Template related issues	P18	Transaction template construction	P1,P9,P23
X23:-Hardware standard thresholds	P21	Hardware scalability	P8,P20
X24:-Controls for communication	P22	Controls and security	P3,P17,P25
X25:-Data ownership is often political	P23	Data and file processing	P9,P25

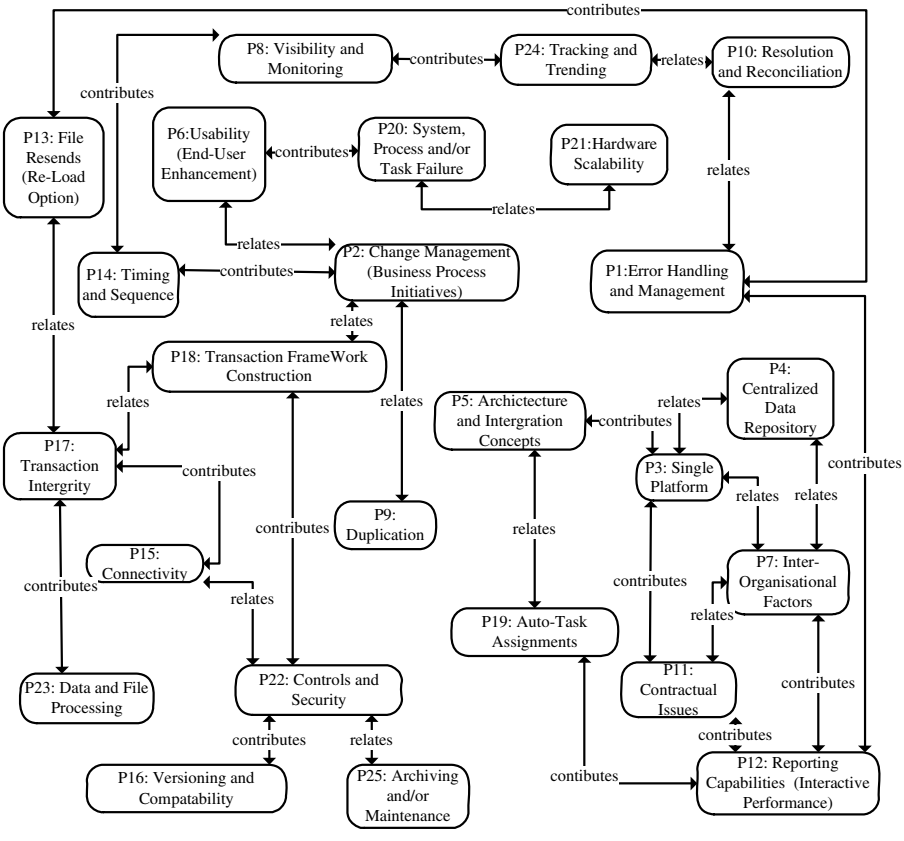

Fig. 2. The pattern language of B2B adoption

The overall structure of the pattern language is shown in figure 2.

The pattern language for B2B adoption shows the structure of the pattern relationships E.g. in table 2 we extrapolate an example of one such pattern. P2:-*change management and business process initiatives* involves following through process to identify deficient, broken and non-existent processes so as to reengineer changes or upgrades to take advantage of P14:- *timing and sequence* (according to process). Company sets up a change initiation process that begins with using a pre-defined template to clarify business need. Company will then assess architectural fit for P18:-*transaction framework construction* to consider component reuse, advancement opportunities, coupling, and technology use when creating scope, vision, and delivery plan for change. P6 *usability and end user enhancements* are related to a successful change process in P2:-*change management and business process initiatives* as users have a direct role in system transition. P9:-*duplication* includes considerations such as: when converting from paper to electronic what business rules should be established for duplicate business documents found? Specifically, which document, paper

Table 2. Example Pattern and Model in the B2B adoption domain

Name	P2-Change Management and Business Process Initiatives
Business Problem	Companies face difficulties in the change process to support B2B initiatives. They try to patch new systems onto the existing system because they are caught up in balancing between needs of tactical survival and strategic viability.
Solution	There is a need for organizations to discuss the best mechanism for initiating changes while evaluating and evolving existing processes to successfully utilize B2B solutions. The overall suggestion is to pick one thing and do it consistently (a key change management concept) then add another-continuous improvement to a standard format while understanding the stages of B2B transaction growth and reengineer business processes (such as order fulfillment and delivery) concurrently with B2B implementation. In addition change management helps companies to implement B2B in a way that addresses "people" issues that may arise while moving from the current state to the desired state. The business context should address the processes, organization, people and technology. Following is a structural layout that could be followed: The first step is to identify the current process. The company implementation manager partners with the trading partner to identify all components of the current process, including: ■ Process Steps – Points within the process when an action, or set of actions, are performed on the business document. For each step, trading partner should specify: • Entrance criteria • Actions that must be performed; actions that may be performed • Exit criteria • The next possible step or steps, and what determining factors should be used when there are multiple possible steps: ■ Work Assignment – For each processing step, identify how the work is assigned. For each step, Trading partner should specify: • To which users or groups the work is assigned • Secondary/default user assignments • The criteria used to identify to whom the work is assigned ■ Processing Controls – Points within the process where work is controlled, either through an approval step or second-level review. Processing controls should include: • Who is performing the approval or second-level review • What occurs when the reviewer accepts or rejects the reviewed work In all this organizations need to build business decision-making capabilities in the B2B processes explaining the underlying principles and approach all aimed at adding trading partner value. E.g. work with the appropriate trading partners to determine the impact of the scope change.
Motivation	Business process reengineering initiatives will help in achieving cost reduction, improved quality, trading partner satisfaction, and time reduction involved in the execution of each of the business process.

or electronic, should be discarded? Under what circumstances (e.g. order in which they were received, level of detail entered/loaded, etc.)? This is related to P2:-*change management and business process initiatives.*

4 Pattern Validation Results and Discussion

This section presents our findings from evaluating the B2B pattern language. The features examined in the evaluation process of the B2B pattern language where: (1) usefulness of the knowledge embedded in the patterns and (2) the usefulness of the

pattern format to knowledge capture. This was done after 25 patterns were developed and presented in the pattern language c.f. figure 2. 20 evaluators from 12 organizations in total answered questionnaires addressing the criteria shown below.

The evaluation process starts out by identifying hypotheses that are presented as statements and/or possible theories. Evaluations using these hypotheses tests feature (1)-the usefulness of the knowledge embed in the patterns for the B2B environment. This was in line with the evaluation criterion developed for the ELEKTRA approach as follows:

- *Hypothesis 1 Usefulness*: The knowledge embedded in the pattern would provide a substantial contribution for a transaction oriented trading partner to resolve an existing problem.
- *Hypothesis 2 Relevance*: The pattern addresses a problem that is significant for B2B transaction oriented companies.
- *Hypothesis 3 Usability*: The knowledge embedded in the pattern can be used by a trading partner to resolve an existing problem.
- *Hypothesis 4 Adaptability*: The pattern can be tailored and modified with a reasonable amount of effort in order to produce a template for a specific trading partner.
- *Hypothesis 5 Adoptability*: The pattern is likely to be used in a real situation by domain experts in order to respond to a need in a trading partner.
- *Hypothesis 6 Completeness*: The description of the pattern is complete.
- *Hypothesis 7 Coherence*: The description of the pattern is coherent.
- *Hypothesis 8 Consistency*: The pattern fully conforms to the existing knowledge and vocabulary of the B2B transaction sector.
- *Hypothesis 9 Prescriptiveness*: The pattern clearly describes the solution to the problem addressed and lays out the individual elements of the solution and the steps for their implementation.
- *Hypothesis 10 Granularity*: The pattern provides a solution with a level of detail reflecting the level of abstraction of the problem addressed.

Evaluation feature (2) addresses the usefulness of the pattern format to knowledge capture also used evaluation criterion developed for the ELEKTRA approach as follows:

- *Hypothesis 11 Usefulness*: The language captures and conveys the relevant knowledge for describing patterns.
- *Hypothesis 12 Comprehensiveness*: The different elements of the pattern (e.g. problem, solution, and motivation.) are adequate for understanding its purpose.
- *Hypothesis 13 Richness*: The language is able to describe the different aspects of a pattern one is expecting in such a description.
- *Hypothesis 14 Relevance*: The conceptual primitives chosen are appropriate for expressing the respective parts of pattern knowledge.

The measuring scale was done for 2 options, a “yes” or “no” option such as adoptable and not adoptable.

4.1 Findings Concerning the Usefulness of the Knowledge Embedded in Patterns

This section presents the usefulness of the knowledge embedded in patterns. Due to space limitations we present the overall analysis concerning the whole pattern language. The complete evaluation results will be published later this year. Percentages are used to present a clearer perspective of the evaluators that were for or against a specific pattern. We also present the reasoning behind those for and against. However in some cases the disagreement was not commented on thus warranting a further investigation and analysis.

Hypothesis 1 *Usefulness*: Evaluating the overall usefulness of the pattern language, most evaluators (71%) have regarded them as useful. Most of the comments were in agreement with the usage in terms of the general theme of the pattern language. However for (29%) of the evaluators that disagree, comments are related to some of the patterns being too general and covering a wide scope. In some instances suggestions were made for improvement such as the introduction of specific advice on certain patterns.

Hypothesis 2 *Relevance*: Most of the evaluators (71%) regard the content of the pattern repository as relevant to the B2B domain. It is noted that the same evaluators who considered the pattern language useful also considered the problem described in the pattern as relevant to the problem domain, probably because they viewed them as useful and relevant.

Hypothesis 3 *Usability*: (70%) of evaluators agree to the usability of the repository. However (30%) of evaluators do not agree that the patterns aim at being usable to solve an existing problem in the context of a real application. The argument for this is that in some instances the patterns are too general for the unique needs that surround B2B players.

Hypothesis 4 *Adaptability*: On a slightly lower scale compared to the first three hypotheses, (67%) of the evaluators consider that the solution advocated by the pattern can be tailored and modified in order to produce a model for a specific organization reflecting a particular situation. Some evaluators were skeptical because they argue that this process would involve interpretation of knowledge and, adaptations of this knowledge to fit the situation being addressed. According to them this is not possible to achieve for trading partners in a B2B environment.

Hypothesis 5 *Adoptability*: An equal percentage of evaluators think that the solutions of the patterns are adaptable as adoptable. For (67%) the pattern shall be applied in a real situation by domain experts for resolving a particular problem of interest in order to respond to a need in a specific organization. For the (33%) that disagree comments provided suggest that evaluators were looking for more concrete and detailed solutions.

Hypothesis 6 *Completeness*: Most of the evaluators (70%) consider the pattern offers a complete description of the problem and solution under consideration. Those that regarded the solutions as being incomplete expressed their desire for more elaborated solutions.

Hypothesis 7 *Coherence*: The evaluation results regarding the coherence of the problem description is fairly good (73%). We conclude that most of the evaluators

regarded the problems addressed and solutions proposed as related. Furthermore some additional pattern relationships were suggested.

Hypothesis 8 *Consistency*: At (75%) of the evaluators, the results of this evaluation strongly are in favor of Consistency. The evaluators regarded the patterns as being consistent with the knowledge and vocabulary used in the B2B domain. In some instances evaluators advocated for inclusion of more standardized platform solutions.

Hypothesis 9 *Prescriptiveness*: Most of the evaluators (79%) consider that the pattern clearly describes the solution to the problem addressed and lays out the individual elements of the solution and the steps for their implementation. For (21%) the level of abstraction is too high. Evaluators suggested refinement of concepts and presentation in a stepwise format.

Hypothesis 10, *Granularity*: 71% of the evaluators regard that the patterns propose a solution at the appropriate level of detail. However, (29%) of the evaluators are consistent with the previous comments about the patterns being too general and the need for more examples. The main criticism concerned the level of detail and thoroughness of the proposed solutions.

In presenting an overview of evaluator's comments, the idea was that outside the patterns discussed above there are more issues that would fit as business problems. E.g. lack of adequate e-commerce expertise in the firm resulting from little or no time to develop new skills for B2B efforts, limitations posed by existing infrastructure in companies, improper business planning and poor investment decisions coupled with lack of strategic vision for B2B e-commerce which presents problems in measuring benefits of B2B e-commerce efforts.

Evaluators also point out that for B2B initiatives to succeed there is need for time, energy and investment from senior executives. Given that managers are enthusiastic about IT, this can be used to rally top management support for B2B e-commerce efforts. This provides strong and charismatic leadership to craft a marketable and compelling B2B vision.

Furthermore domain expertise and well-defined processes are a prerequisite for effective B2B systems success. Organizations that fail to realize this continually struggle with a myriad of problems.

Finally, organizations need to comply with standards by allowing their organizational processes to get redefined. Identifying clear cut responsibilities and dividing them according to team efforts is crucial to the success of the B2B systems.

4.2 Findings Concerning the Usefulness of the Pattern Format

This section presents the usefulness of the pattern format. There are four hypotheses used for evaluation as follows:

Hypothesis 11, *Usefulness*: The evaluation is more optimistic with regard to the pattern format being able to capture and convey the relevant knowledge for describing patterns. Evaluators that supported the approach recommended the structure of the pattern language, especially the problem-solution guideline. However some evaluators recommended inclusion of more items such as diagrammatic representation in the pattern format. This could include audio and even video where applicable.

Hypothesis 12, *Comprehensiveness*: Most of the evaluators consider the different elements of the pattern (e.g. problem, solution, motivation.) are adequate for

understanding its purpose. For the evaluators that disagree suggestions included adding pictures to the pattern format to make explanation much easier.

Hypothesis 13, *Richness*: An equal percentage of evaluators think that the language is able to describe the different aspects of a pattern one is expecting in such a description as in hypothesis 2 above. Comments given here were almost identical to the ones in comprehensiveness. Apart from one evaluator who was of the view that the B2B process can be a very complex network and was skeptic about using the pattern approach to fully describe this in detail. This could be that she did not fully appreciate the pattern approach to knowledge capture.

Hypothesis 14 *Relevance*: For most of the evaluators the conceptual primitives chosen are appropriate for expressing the respective parts of pattern knowledge.

On the basis of the evaluation the following improvements have been proposed: The pattern should be further subdivided, more pictures should be included and example cases for pattern applicability should be included in detail. The argument is that the example cases can work as models for organizations that would be interested in adopting the pattern language.

4.3 Comparison with Other Pattern Application Cases

In this section we review a few example cases of application of organizational patterns. Organizational patterns have been created and applied in practice for considerable time. They have been used for various domains (e.g. electricity supply industry (ESI), public administrations, healthcare) and for various problems (e.g. company restructuring, change management, collaborative engineering (CE), treatment practices). Summary of five such cases and the case reported in chapter 3 is given in table 3.

The early cases of pattern development started the development process in a more top down fashion, i.e. identifying the overall problem and then decomposing it into a number or more manageable sub-problems. The resulting pattern languages of the ELEKTRA project and the cases at Riga City Council and Verbundplan were similar to goal hierarchies. In the later cases the patterns were developed in a more explorative way, i.e. the process started by investigating the initial problems, knowledge needs and requirements. E.g. at Skaraborgs hospital a knowledge map was used to identify the knowledge needs and structure patterns. The MAPPER project performed more than 10 modeling workshops with the domain experts. In the B2B adoption case a series of explorative interviews were carried out with a number or experts in the B2B domain. The evaluation results seem to suggest that this way of working contributes to the overall usefulness of the resulting pattern language. In summary, the explorative way of working allows the pattern developers to identify and address more problems with practical significance.

Concerning the appropriateness of using the pattern format, the results of the six cases show that the domain experts appreciate the problem-solution view on their competitive knowledge and expertise. The pattern template has been tailored in all these cases to improve the comprehensiveness and richness of patterns.

Furthermore it seems that the way the pattern development process engages the domain experts also influences the potential impact of the patterns. In this context additional challenge is to transfer the pattern development knowledge to the domain

Table 3. Summary of different pattern application cases

	ELEKTRA project, [8]	Riga City Council, [9]	Verbundplan GmbH,[3]	Skaraborg Hospital, [5]	MAPPER project, [10]	B2B Adoption
Period of time	1996-1999	2001-2003	2001-2003	2004-2007	2006-2008	2006-2009
Domain	ESI	Public administration	Consulting for the ESI	Healthcare	CE in the automotive sector	B2B
Problems addressed	Best practices of human resources management & electricity distribution	6 pilot cases in areas such as outreach work, police, transport department, and schools	Repairing of serious damages in hydro power plants and project risk management.	Management of treatment best practices. Focusing on treatment of leg ulcers.	Product development, and collaboration [11]	Lack of standards and structure in the operation and communication of the B2B environment.
Repository	~40 patterns	~100 patterns, linked to some multimedia content	~80 patterns, links to documents, definitions and multimedia	~100 patterns, documents and multimedia content	~30 patterns, some linked to executable services	~25 patterns
Use of models to document the solution	In almost all patterns contained fragments of enterprise models.	Some contained enterprise models, other kinds of models were also used	Some contained enterprise models, other kinds of models were also used	Very few models and diagrams were used to convey the solution	Patterns were part of Active Knowledge Modeling (AKM) [12]	Some patterns documented as models using tabular formats
IT support	HTML pages	Content management tool and web export	Content management tool and web export	Web based content management system integrated with the hospital's webpage	METIS tool and the AKM platform.	Document, proposal for HTML pages
Pattern developers	Researchers, developers of approach	Domain experts with heavy involvement of outside experts and consultants	Domain experts with heavy involvement of outside experts and consultants	Domain experts assisted by researchers	Outside experts, consultants researchers and domain experts in a collaboration	Researchers assisted by domain experts
Evaluation	Questionnaire, formal, after the project	Questionnaire, formal, after the project	Questionnaire, formal, after the project	Informal, discussions and workshops, feedback during the project	Scorecard based, iterative, several times during the project.	Informal discussions, and feedback during project
Usefulness of the knowledge content	Low	Low	Medium	High	Medium	Medium
Appropriateness of the pattern format	Medium	Medium	Medium	High	High	High
Potential impact	Low	Low	Medium	High	Medium to high	Medium- more investigation needed

experts and to make the pattern based approach to knowledge sharing an accepted way of working in the organization. From the five cases reported in this section, this has been achieved only at Skaraborg Hospital (for more detailed analysis see [5]). For the MAPPER project it is too early to conclude whether the pattern approach will survive at the target organizations in the long term. Concerning the B2B adoption case, the dissemination process is not yet complete.

5 Concluding Remarks and Future Work

We have presented a validated pattern language of B2B adoption practices. These patterns can be seen as generic and abstract organizational design proposals that can be easily adapted and reused. While the validation process has shown that the quality of the patterns is high, continuous improvement of the patterns can be done through application feedback, reviews and corresponding adjustments.

More specifically, concerning the usefulness of the patterns we conclude the patterns are useful. Concerning the appropriateness of the pattern format we conclude that the format is useful. However depending on the domain, additions to the pattern elements such as pictures should be emphasized. Further more process models can be included to present a high level overview of the system in discussion.

We have also compared the findings from the validation of this case with five other cases which leads to conclude that patterns are valuable means for capturing and sharing various kinds of knowledge in different domains (e.g. engineering, IT, management, and healthcare). On the other hand, considering the varying degree of long term impact of the pattern use in organizations, we would like stress that more research should be devoted to supporting the process of adopting pattern-based ways of working in and knowledge sharing.

Patterns have also showed potential for acting as means for configuring enterprise information systems. Despite initial promising experiences [10] more research should be devoted to connecting patterns to services thus making the solutions proposed by patterns executable. This would make patterns a central part of enterprise architecture.

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