TOWARDS A COST EFFECTIVE IMPLEMENTATION OF INFORMATION TECHNOLOGY SERVICE MANAGEMENT

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Abstract

Information Technology Service Management (ITSM) delivers IT based services to organizations. It supports the attainment of business goals by aligning IT activities with business process requirements. ITSM is usually implemented by following a process oriented approach that is further specified by dedicated frameworks like the ISO 20000 standard and the IT Infrastructure Library of the Office of Government Commerce. However, due to cost effectiveness considerations a complete implementation of such frameworks is not necessarily required, since opportunities for improvements can be located in a limited set of process areas, depending on each organization's individual case. In order to follow this approach, a solution proposal is presented that supports cost effective implementation of ITSM. The solution is based on sharing specific knowledge that eases the identification of relevant objectives within ITSM frameworks and furthermore supports the identification of dependencies for implementation planning. The solution is validated in an industry case for ISO 20000. Results of the conducted validation indicate the solution's fitness for purpose.

Keywords: Information Technology Service Management (ITSM), cost effective implementation, ISO 20000, ITIL

1 INTRODUCTION

Information Technology Service Management (ITSM) is a process-oriented approach to deliver IT based services to organizations (ISO 20000-1). It supports the attainment of business goals by aligning IT activities with business process requirements (Winniford et al., 2009). ITSM is usually implemented by following the prescriptions of dedicated frameworks like the ISO 20000 standard (ISO 20000-1) and the IT Infrastructure Library of the Office of Government Commerce (ITIL Service Design Version 3). The application of ITSM is primarily motivated by cost effectiveness considerations and an organizational shift towards a customer oriented service provision (Cater-Steel & Pollard, 2008; Cater-Steel et al., 2006), i.e. delivering required services at competitive prices.

A problem to adopt ITSM frameworks under cost effectiveness considerations is their holistic approach. They cover a wide range of aspects regarding IT based services (Winniford et al., 2009). However, depending on each organization's individual case, opportunities for improvements can be located in a limited set of process areas. Therefore, it is the paper's goal to support the determination of a case dependent and suitable intensity of framework implementation as demanded by Cater-Steel et al. (Cater-Steel et al., 2006).

Since a recent literature scan did not reveal any solutions, a joint venture was initiated to develop such a solution in cooperation with an industry firm, which provides practical expertise in the field of ITSM. In order to find a potential solution, the initial issue of a case dependent and suitable intensity of framework implementation is subdivided into three questions:

1. How can be determined if further process improvement actions according to the prescription of consulted frameworks would be beneficial regarding quality and cost aspects?
2. If further process improvements are indicated, which objectives of consulted frameworks will be good options to be considered in a specific case?
3. If objectives are selected, are there any dependencies to be taken into account? For instance, a chosen objective might require other additional implemented objectives within a framework.

Regarding the first question, a model has been developed that can be applied within IT to heuristically determine optimal intensities of framework implementations (Deutscher & Felden, 2009). The term intensity serves as proxy for a degree of implementation. Specifically, the model guides decisions whether further process improvements are beneficial based on cost and quality considerations.

The literature review failed to reveal solutions of the second and third question, though they are relevant for particularly two reasons: *First*, partial implementation of frameworks according to the needs of an organization makes it is necessary to assess each objective for its potential contribution incurred by implementation. This will enable organizations to focus on required aspects of frameworks and therefore invest in IS related capabilities that provide value to its respective organization. *Second*, processes of frameworks might depend on other processes that require implementation in advance. Therefore, possible dependencies are to be identified and considered when implementing frameworks. For instance, a complete implementation of *problem management* requires input from *incident management* to coordinate a proactive prevention of incidents disrupting service provisions (ISO 20000-1).

The contribution of this research is the provision of a solution proposal to cope with issues raised by the second and third question. It is based on sharing specific knowledge to improve processes (Eppler et al., 1999). The approach roots back to the theory described by Nonaka et al. (Nonaka & Takeuchi, 1995), exemplifying the role of knowledge to continuously innovate and finally create competitive advantages (Nonaka & Takeuchi, 1995). Referring to the given problem, the sharing of knowledge facilitates control (Beimborn et al., 2009) that enables the IT department to decide on frameworks' objectives for implementation and to consider possible dependencies.

The paper's contribution is a proposed solution that is implemented by an artifact that supports knowledge sharing as follows: *First*, the externalization of knowledge is supported by using interpretation modes that allow the elicitation of relevant knowledge. *Second*, the internalization of knowledge is supported by providing a structured and explicit documentation of gathered knowledge through an ontology. *Third*, a workflow is presented that eases the integration of the proposed solution in a practical context. The artifact is validated in an industry case for ISO 20000. The results indicate the solution's fitness for purpose.

In order to attain the contribution of this research, the remainder of the paper is structured as follows: The methodology applied for construction of the solution is introduced in Section 2. The results of its application, specifically the results of the *concept stage* and the *validation stage*, are presented in Section 3. Finally, Section 4 presents conclusions from the results and further research perspectives are given.

2 METHOD

The aim of this research is the provision of a solution that supports the contribution of information systems to organizations' success. It is reached by the creation of an artifact that supports the application of IT process improvement frameworks within the domain of ITSM. The intention of this research complies with findings of March et al. regarding the purposes of design science based research (March & Storey, 2008). Therefore, a methodology is used to construct (design) a solution that is finally evaluated for applicability by an industry case. An industry based use case was chosen since it allows direct involvement with ITSM processes in a practical context at our cooperation partner. The direct communication with domain experts and ITSM managers eases the identification of relevant issues for the research.

The solution construction and evaluation are guided by a methodology that is synthesized by scanning prominent literature regarding the aspect of artifact construction (Eder, 1998; Gass, 1983; Kramer & Neculau, 1998; Law & Kelton, 2000; Balci, 2003). It consists of the following stages:

1. **Problem Formulation**: The construction is initiated by a problem formulation that is to provide an explicit understanding of a current situation requiring change. In general, the context in which the problem arises is to be specified and particularly undesired aspects of the status quo are to be identified.
2. **Requirement Specification:** The proceeding requirement specification is a derived collection of needs in order to change the current problem situation as desired. In addition, limitations can be defined regarding the solution as well as assumptions.
3. **Concept:** The following construction of the concept provides a solution attempt in the state of an idea whose implementation solves the problem.
4. **Concept Validation**: This stage examines the concept's validity, which is the inspection of the concept's potential to solve the problem by meeting the requirements formulated in the requirement specification stage.
5. **Implementation:** If the concept is valid, it is implemented. At this point, an approach is chosen to pursue the realization of the concept. In the specific case of this research, an ontology is created that implements the concept's idea. Since the selection of an implementation methodology requires additional examinations, it is further documented in section 3 that comprises brief results of the implementation stage.
6. **Verification:** The purpose of the verification stage is to analyze, if the implementation covers the requirements of the specification. It can be achieved by thoroughly testing the solution (Sommerville, 2007).
7. **Validation:** During the validation stage, it is examined if the created solution is fit for purpose. In this context of problems to be solved, there is no approach to final validation, but results of this stage indicate the artifact's result accuracy within its intended field of operation.

Since the construction of artifacts is considered as iterative process (Hevner et al., 2004), it might be necessary to traverse the aforementioned stages several times until satisfying results are obtained. Thereby, the results of the validation stage serve as initial point regarding the decisions on future efforts of an artifact construction. The methodology is applied in this project and results are documented in the following section. Findings regarding the methodology's application are examined in the conclusion.

3 RESULTS

This section presents the results of applying the construction method. Due to limited space, emphasis is put on the presentation of the concept stage and the validation stage, as they embody the solution's proposal and its evaluation by practical application.

Problem Formulation and Requirement Specification

IT process improvement frameworks support IT departments in delivering required provisions to the respective organization. This is accomplished by defining objectives that specify what or how the entire service provision should be realized. In addition, guidelines can be provided on implementing effective processes (Willson & Pollard, 2009). The use of prominent frameworks yields the possibility to conduct cross-organizational benchmarks by comparing organizations' process development (Debreceny & Gray, 2009). Moreover, the use of prominent frameworks results in a standardization effect that improves cost control (Dameri, 2009), e.g. by enabling transfers of gathered experience.

Depending on each organization's individual case, opportunities for improvement can be located in limited sets of process areas within ITSM frameworks. For instance, a top IT related issue according to the IT Governance Institute (IT Governance Institute (ITGI), 2006, IT Governance Institute (ITGI), 2008) are operational incidents that cause disruptions in service provisions to customers. The resolution of such incidents and the prevention of occurrences falls within the scope of the resolution processes within the ITSM according to ISO 20000 and ITIL (ITIL Service Design Version 3; ISO 20000-1). The issue given by the example can be resolved by focusing the framework's adoption on resolution processes. This leads to the need for a solution that supports the determination of a case dependent and suitable intensity of framework implementation as proposed by Cater-Steel et al. (Cater-Steel et al., 2006).

One solution is further specified by the following requirements (R1, R2, and R3) that are directly deduced from the aforementioned lacks:

1. <u>R1: How are the objectives within frameworks to be assessed?</u>
   The provision of each objective is to be valued towards its contribution of supporting the attainment of goals in organizations.
2. <u>R2: How are sequences for implementation of promising objectives identified?</u>
   Possible interdependencies within frameworks are to be considered, because provisions are usually composed of several interrelated sub elements that provide demanded services (Eder, 1998).
3. <u>R3: How is a potential solution used in a practical context?</u>
   Guidance is required on how a potential solution of R1 and R2 is used in a practical context. In particular, this is relevant to the validation case to ensure correct use of the solution.

The requirements are expressed as questions for which answers are expected by the provisions of the solution that is to be constructed. A concept to fulfill the requirements is presented in the next section.

Concept

The concept is based on sharing specific knowledge to improve processes (Eppler et al., 1999). The approach roots back to the theory described by Nonaka et al. (Nonaka & Takeuchi, 1995), exemplifying the role of knowledge to continuously innovate and finally create competitive advantages (Nonaka & Takeuchi, 1995). Therefore, sharing knowledge serves as vehicle to provide transparency in organizations to improve the control of processes (Beimborn et al., 2009).

The proposed concept emphasizes on the following aspects within the process of knowledge sharing according to Nonaka et al. (Nonaka & Takeuchi, 1995):

1. The *externalization of knowledge* is performed by using certain interpretation modes. Each used mode is intended to elicit certain aspects of the subject under consideration. This approach is based on interpretation modes used in roman and specifically German jurisprudence (Larenz, 1991). In order to attain the objective of this research, the following subset of modes is used:
   - Literal interpretation: The *literal meaning* of the objective is a general explanation of the respective objective. This includes, as necessary, definitions of the terms and the objective's scope. The main question for elicitation is "What is the meaning of the objective?"
   - Purposive interpretation (also known as teleological interpretation): The *capabilities gained* by the objective's attainment express its purpose. The main question for elicitation is "Which capabilities will the organization gain by attaining this objective?"
   - Hierarchical interpretation: The *capabilities required for attainment* express preconditions that are necessary for implementing the objective. This interpretation mode is a preparation to determine an objective's role within a system of interrelating objectives. The main question for elicitation is "Which capabilities are required to attain the objective?"
2. The *internalization of knowledge* is provided by a structured and explicit documentation of gathered knowledge. Figure 1 provides further explanation of the approach: Objectives are enriched by knowledge, gathered according to the aforementioned interpretation modes that additionally allow inferring interdependencies. These interrelations in terms of dependencies allow the identification of possible implementation sequences by sorting out sequences that violate dependencies.

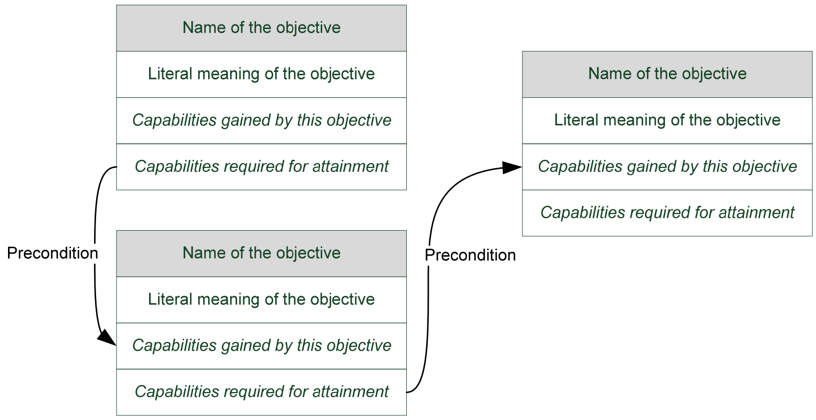

Figure 1. Structured documentation of knowledge gathered by proposed interpretation modes.

Furthermore, the following workflow is proposed to provide guidance on how an implementation of the concept is used in a practical context:

1. The assessment of objectives begins with the identification of objectives for interpretation. Then, domain experts are consulted in interviews using the interpretation modes of the concept. The gathered knowledge is documented in a structured fashion as demonstrated by Table 1. Additionally, the results are visualized as proposed by Figure 1 and completely pursued in the *validation case*, as depicted in Figure 3. Finally, the gathered knowledge is reviewed by domain experts and corrective actions are taken, if necessary. This may include the need for additional iterations of this stage.
2. During the analysis of specific needs, objectives are identified whose implementations provide required capabilities to the organization. Methods supporting this step are within the domain of system analysis / business analysis and beyond the scope of this paper. An overview of such methods is provided by the International Institute of Business Analysis (International Institute of Business Analysis (IBA), 2006). At the end of this stage objectives are identified that can be implemented through the attainment of objectives defined by frameworks.
3. Finally, additional objectives are inferred by the aid of the ontology. These objectives are required to implement the capabilities identified by the analysis of specific needs (previous step). The

ontology supports the inference of these dependencies through linking objectives by their *purposive* and *hierarchical interpretations*.

The proposed stages of the workflow might be applied several iterations until the involved stakeholders value the results as sufficient for the intended purpose. The concept is assessed for feasibility in the next section.

Concept Validation

The concept validation can be guided by a document denoted as structured walk through (Law & Kelton, 2000). In the present case, such a document is used which relies on a proposal of Law et al. (Law & Kelton, 2000). It covers several aspects that are relevant to ensure a transparent concept validation. Specifically, aims connected with the project are explicitly stated and a clear differentiation is drawn regarding non-aims. Furthermore, the conduct of the concept's feasibility assessment is documented. This includes taken assumptions, validation exercises and the achieved results. Based on the results, decisions are made regarding the construction's continuation. In respect to economic restrictions, each requirement's effort of implementation is considered and valued in respect to the overall aims of the project.

A prime aspect of the concept validation stage is to determine whether requirements (R1, R2, and R3) are covered by the proposed concept. The following arguments initiate this evaluation process: *First*, the literal interpretation mode serves as initial basis for all other interpretations, since it promotes a clear definition of objectives' meaning and scope. *Second*, the assessment of objectives (R1) is conducted by using the purposive interpretation mode to elicit the capabilities provided through implementation of objectives in frameworks. *Third*, possible interdependencies within frameworks are considered (R2) by identification of preconditions, which are linkages of purposive and hierarchical interpretations among objectives. *Fourth*, the proposed workflow (R3) provides a staged procedure of the concept's application in a practical context.

The concept validation was conducted in cooperation with an industry partner whose aims will be further presented in the validation stage. Since the concept is appreciated and valued as promising attempt by our cooperation partner, the construction was continued.

Implementation

The proposed solution is implemented by an artifact that consists of the following components as introduced in the concept stage: *First*, the interpretation modes used for knowledge elicitation. *Second*, the structured documentation of gathered knowledge. *Third*, the workflow that proposes a staged procedure of the solution's application. The first and third component is in a useable state for the validation case. Therefore, they require no further implementation at this point. However, the second component needs an implementation that enables an explicit documentation of structured knowledge. This is accomplished by choosing an ontology that provides required capabilities of knowledge documentation and sharing (Visser & Bench-Capon, 1998; Noy & McGuinness; G. van Heijst et al., 1997).

In order to obtain desired results and to allow a transparent construction, the application of a dedicated ontology construction methodology is indicated (G'abor, 2007) . The methodology is chosen in respect to the ontology's type and purpose (Pinto et al., 2004), which is in the present case the representational type for knowledge sharing. The result of the literature review is a decision towards Methontology that uses the most consented terminology (Beck & Pinto) and was successfully applied in several projects (Gómez-Pérez, 2004; López et al., 2000; Corcho et al., 2005; Mikosa & Ferreira, 2007; Park et al., 2008). These former applications provide additional guidance in using Methontology for this research. Figure 2 depicts the results of the implementation stage.

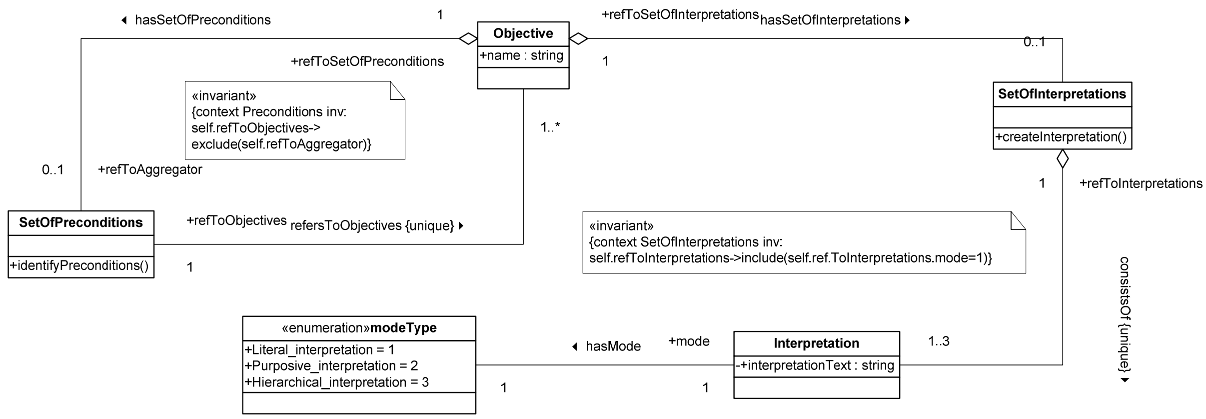

Figure 2. *Meta-ontology as result of the implementation stage, used to document gathered knowledge in a structured conduct.*

An objective may have a set of preconditions that may contain any number of references to other objectives. In order to avoid circular references, an invariant in the context of preconditions is introduced. Furthermore, an objective may have a set of interpretations. Each interpretation corresponds to a mode as defined in the specification. If necessary, additional interpretation modes can be added dynamically. The second invariant within the context of interpretations ensures that at first an objective receives a literal interpretation. The reason for this enforced order is the result of conducted observations during the ontology's use in the project: A shared understanding of an objective's meaning supports the identification of required and provided capabilities. This approach is evaluated in the next section.

Verification and Validation

The verification stage focuses on technical implementation aspects. Its main purpose is to ensure proper implementation of the specification. This can be achieved through testing the solution by test cases that cover relevant aspects of the specification (Sommerville, 2007). The ontology created in this research was tested by ontology engineers of the university in cooperation with domain experts of our cooperation partner. The domain experts ensure the test coverage towards an intended application of the artifact in the domain of ITSM. The artifact passed the verification and the construction procedure was continued.

The succeeding validation's intent is to confirm whether the proposed solution is capable of solving assigned tasks (Balci & Sargent R. G., 1982; Carson, 2002). This is achieved by a practical application of the solution, which is conducted in cooperation with an industry firm.

Our cooperation partner[1] aims to reduce service disruptions caused by operational incidents through improving ITSM according to the ISO 20000 standard. The decision for improvement received further confirmation by using the model proposed by Deutscher et al. (Deutscher & Felden, 2009). The results of the model's application in this case indicate that process improvement actions are beneficial regarding cost and quality aspects. By using the model, aspects raised by the first question presented in the introduction are covered. The remaining aspects, i.e. the second and third question, are covered by the solution presented in this contribution.

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The solution is validated by following the workflow proposed in the concept stage (Section 3). It is initiated by the assessment of objectives. The interpreted objectives are the requirements defined by the ISO 20000. Since our cooperation partner provides consulting services for ITSM, several certified experts are available for interviews. The results of the interviews by using the interpretation modes are documented by using an implemented version of the ontology. A sample of the results is presented in Table 1.

Objective 1:	Procedures shall define the recording of all incidents.
Literal meaning:	The recording of incidents should be defined by procedures. A bypass of event message processing is to be excluded. An incident is provided by a customer, for example via mail, telephone or fax. The incident will initiate the opening of a new ticket and all required information will be recorded by the service desk.
Capabilities gained:	Incidents embodied by the same message type will be recorded uniquely and the recording is independent of individuals. The procedures serve as foundation for a workflow that can be supported by IS. Furthermore, statistical analyses can be conducted, for instance to document the fulfilment of service level agreements (SLA's).
Capabilities required:	The requirements for incident processing are to be available and reviewed on a regular basis. Furthermore, input from service level management and operations management is required.
Objective 2:	All incidents shall be recorded.
Literal meaning:	All incidents are to be recorded. An incident may be a false report (a non-agreed service or performance is not met), fault (an agreed service characteristic is not met) or a note (the agreed services are delivered, but the customer addresses from his point of view a proposal for improvement).
Capabilities gained:	No incident gets lost. The complete recording allows creating reliable statistics for the coordination of improvements. Accumulations of quality deviations can be identified and the issue can be clearly addressed to responsible units / teams.
Capabilities required:	It is to be defined how and what needs to be recorded. The definitions are to be updated, if changes occur.

Table 1. Sample result of the solution's application in the ISO 20000 standard for ITSM.

The second objective requires capabilities that can be provided by implementing the first objective. This is deduced by searching capability provisions of other objectives that can deliver the capabilities required of an objective under consideration. Therefore, the second objective gets the first objective assigned as precondition. An objective may have any number of preconditions (including none). The identification of preconditions is performed after all objectives have been interpreted according to the specified interpretation modes (as proposed in this concept). Additionally, the visualization of the ontology follows the proposal of the concept stage. Figure 3 shows an excerpt of the results.

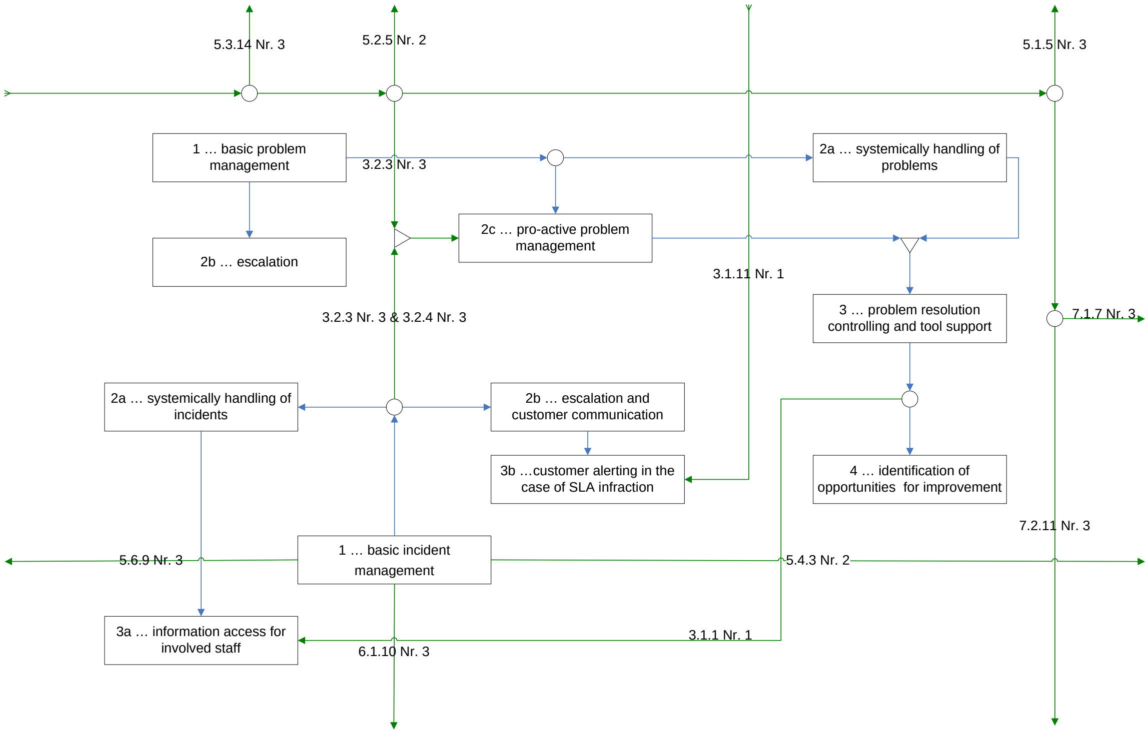

Figure 3 Excerpt of ontology visualization in the industry case for ISO 20000.

The lines between the boxes represent dependencies between objectives. They are inferred based on the gathered knowledge by purposive and hierarchical interpretation modes (see Concept). The circular shaped line connector serves as distribution point for one dependency. For example, *basic problem management* serves as precondition for *pro-active problem management* and *systematic handling of problems*. The rectangular shaped line connector denotes an alternative regarding the path that can be taken for implementation (understood as logical or). For example, *problem resolution controlling and tool support* can be implemented by *pro-active problem management* and/or by *systematic handling of problems*. The shown boxes represent groups of dependent objectives that provide relevant capabilities to the IT and its organization. They are identified with domain experts from our cooperation partner based on dependencies in the ontology. This provides two benefits: *First*, the visualization of complex ontologies is eased due to a reduced number of elements to be drawn. *Second*, more high-level capabilities are defined by creating groups that ease the selection to solve the needs/lacks that are identified in the succeeding stage of the workflow. Since a review of the created ontology and its visualization was considered sufficient, the workflow was continued.

The succeeding activity in the proposed workflow is the identification of potential objectives. The cooperation partner has identified the need to improve the resolution processes that are intended to resolve service disruptions and thereby restore usual service provision (ISO 20000-1). In particular, options were considered that could reduce costs of resolution processes. The results highlight a lack of support in documenting *known errors*. A *known error* is a service disruption for which the cause is found or a workaround exists. Without documentation of *known errors*, issues cannot be identified as reoccurring for which solutions are on hand. This results in high-resolution times through not using gathered experience. Therefore, the specific need in this case is to reduce costs by an improved support in documenting *known errors*. In order to reduce costs, an access to a database that embodies all known errors can reduce time required to restore service operations. Summarized, the analysis of specific needs revealed that capabilities to implement a *known error* database are provided by the objective *problem resolution controlling and tool support* (see Figure 3).

The final stage of the workflow is the identification of interdependencies. The implementation of the objective *problem resolution controlling and tool support* (see Figure 3) has several preconditions.

They can be fulfilled by other objectives within *problem management*, a sub-process of the *resolution processes* (ISO 20000-1). In order to identify additional objectives – representing required capabilities – the ontology is used as follows: Several dependency-paths can be traced by starting the navigation at the identified objective *problem resolution controlling and tool support.* Required objectives are *pro-active problem management* and/or *systematic handling of problems*. Again, these objectives require themselves other capabilities for implementation. Thus, dependency-paths can be traced to *basic problem management* and *basic incident management*. They are initial points for a process development within the resolution processes.

Our cooperation partner implemented *problem resolution controlling and tool support* in compliance to the identified dependencies. As a result, resolution processes were improved as expected and resolution costs were lowered by 12% due to an improved processing of known errors.

The result of the validation case confirms the solution's ability to support a cost effective implementation of ITSM. In particular, the solution eased the assessment of measures that enable desired improvements. This is accomplished by providing an explicit and shared understanding of framework objectives. Therefore, relevant improvement options are identified in less time. Furthermore, the solution ensured an enhanced implementation planning by the identification of objectives' preconditions. As a result, there are only those measures taken that contribute to the attainment of the desired improvement. This tailors the framework implementation to organizations' particular needs. The contribution was confirmed by the experts of our cooperation partner since expectations were met.

4 CONCLUSIONS

The main contribution of this paper is the presentation of a solution proposal that supports a cost effective implementation of ITSM in compliance to the issue raised by Cater-Steel et al. (Cater-Steel et al., 2006). In order to analyze the given issue, three research questions were derived that emphasize the need for determination of a case dependent and suitable intensity of framework implementation. Since a solution is available to the first question (see Introduction), this contribution focuses on the second and third question, which are the selection of objectives in ITSM frameworks and the consideration of interdependencies for implementation planning. The solution proposed in this paper is based on sharing specific knowledge, whereas the roots of the concept lay in the theory described by Nonaka et al. (Nonaka & Takeuchi, 1995).

The findings of the conducted validation indicate the solution's fitness for purpose, i.e. the ability to provide required capabilities. The concept's application in an industry use case enabled a cost reduction of the cooperation partner's resolution processes by 12%. A use case validation was chosen since it allows direct involvement with ITSM processes in a practical context at our cooperation partner. The direct communication with domain experts and ITSM managers eased the identification of relevant issues for the research. However, the industry validation case is a single case study used for validation, whereas general conclusions regarding the validity of the solution are to be drawn with caution. Instead, repeated application is required to provide more insights in the control process as well as the solution's behavior in its intended field of application. Still, the first results indicate the approach to be promising. Therefore, the research is continued by a further project. The results will be used to improve the solution to enable a better provision of knowledge sharing capabilities that support a cost effective implementation of ITSM.

The research methodology supports the collaborative approach that is chosen for the solution's construction. Since several stages are defined, tracing the construction process is eased. This allows involving users who provide valuable feedback to the solution development even though they are less familiar with methodological aspects. As a result, it is possible to focus on the solution's practical application since all stakeholders attended the construction process. Furthermore, the chosen methodology supports frequent assessments of interim results. This assures that corrective measures are effectively applied and requirements regarding the solution are met.

Since this research is in progress, several aspects require further elaboration. The repeated application of the solution in the domain of ITSM could provide further insights on how to improve the solution concerning domain experts' requirements. Moreover, the proposed solution is to be tested across frameworks to analyze, if the approach is a feasible attempt to partial framework based implementations in general. Furthermore, risk related aspects require deeper investigation: Since Espindola et al. have shown that proper framework implementation does not in all cases lead to desired results (Espindola et al., 2009), the risk of not meeting expectations is to be managed.

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