

# Enhancing Knowledge-Intensive Business Processes via Knowledge Management Audit

**Meira Levy**

Department of Management Information Systems  
University of Haifa, Haifa, Israel  
+972-4-8288509  
lmeira@mis.haifa.ac.il

**Irit Hadar**

Department of Management Information Systems  
University of Haifa, Haifa, Israel  
+972-4-8288508  
hadari@mis.haifa.ac.il

**Itzhak Aviv**

Department of Management Information Systems  
University of Haifa, Haifa, Israel  
+972-4-8288509  
avivi@mis.haifa.ac.il

## ABSTRACT

Enhancing organizational Knowledge-Intensive Business Processes (KIBP) for gaining competitive advantages is often performed through Knowledge Management (KM) initiatives. These KM initiatives aim at developing organizational KM infrastructure of KIBP, starting from knowledge audit that is a necessary first step in any KM initiative. Current knowledge audit methods address either technological-related or social-related aspects. None of them was found to deal with the triple perspective of KM infrastructure: culture, knowledge processes and information technology, in the context of KIBP. This paper proposes a comprehensive framework and practical tools for knowledge audit that aim at enhancing KIBP by embedding KM capabilities within them. As KM infrastructure integrates social and technological disciplines, we developed a combined Socio-Engineering Knowledge Audit Methodology (SEKAM) for a systematic audit of the KM infrastructure in the context of KIBP. This methodology is illustrated through knowledge audit in a large high-tech global organization.

## Keywords

Knowledge management, knowledge audit, business processes.

## INTRODUCTION

In the current competitive business world, knowledge-intensive organizations seek to enhance their Knowledge-Intensive Business Processes (KIBP) for gaining competitive advantages. Over the last years, there has been an increased focus on Knowledge Management (KM) as a major part of organizational strategy in knowledge-intensive organizations. However, many KM initiatives do not comply with organizational expectations, partly because knowledge audit, that is a necessary first step in a KM initiative, is being avoided or underperformed (Hylton, 2002). Aiming to improve practical knowledge audit, we developed an audit methodology, which provides comprehensive and systematic guidelines and practical instruments, for eliciting and analyzing KM infrastructure requirements of KIBP. The KM infrastructure components include: KM related culture, knowledge processes and Information Technology (IT) (Sivan, 1999).

Reviewing knowledge audit methods in literature (e.g. Bright, 2007; Handzic, 2008; Iazzolino and Pietrantonio, 2005), we identified several issues yet uncovered in knowledge audit research, specifically in the context of KIBP:

- Most of the existing methods propose to carry out general cross-organizational knowledge audit. We believe that knowledge audit can be more effective and valuable when carried out focusing on specific KIBP.
- Various methods suggest conducting knowledge audit, however usually focusing on a single component of the KM infrastructure. As far as we know, no knowledge audit method exists for multi-perspective KM infrastructure audit, encompassing culture, knowledge processes and IT.
- Most of the existing knowledge audit methods provide only theoretical description of their audit steps, and lack practical instruments for information elicitation and analysis. Some of the methods, which do provide such instruments, focus only on either the technical or the social aspects of knowledge modeling. However, applying only one of these

approaches does not suffice when analyzing the KIBP comprehensive KM infrastructure requirements, since KM is tightly linked to both the engineering and the social perspectives.

Following these findings, we developed the Socio-Engineering Knowledge Audit Methodology (SEKAM) that provides structured detailed knowledge audit guidance regarding all KM infrastructure components in the context of KIBP. Each of the SEKAM steps is based on practical knowledge modeling instruments for information elicitation and analysis.

The rest of the paper is organized as follows: In the next section we present KM infrastructure and knowledge audit related work. Section 3 describes the research method. In Section 4, we present SEKAM and illustrate it with a case study of knowledge audit in a large, global high-tech organization in the semi-conductors' field. Finally we conclude and discuss future work in Section 5.

## RELATED WORK

The need to be responsive in the intricacy of the current frequently-changing business environment leads organizations to develop a KM infrastructure (Lustri et al. 2007). A KM infrastructure is necessary for enabling explicit and implicit knowledge transfer in the organizational network. Sivan (1999) defines three main components of the KM infrastructure: knowledge related culture, knowledge processes and IT.

Many frameworks try to explain organizational knowledge processes. However, there are still no common definitions for knowledge processes in the literature. The analysis of knowledge processes can be performed, for example, using the Knowledge Policies, Programmers and Practices (KPPP) framework (McElroy, 2003), which includes three analysis areas: background factors, knowledge production and knowledge integration. Another example is the Organizational Learning Mechanisms (OLM) framework (Ellis and Shpielberg, 2003), which provides extracting organizational knowledge processes such as formal learning procedures, information dissemination, training, information gathering, storage and retrieval.

Studies in KM underscore the relationship between KM success and organizational culture (Nonaka and Takeuchi, 1995). Organizational culture analysis may help organizations to understand their social environments and take it into consideration when deploying KM solution (Jashapara, 2004). Analysis in the context of KM related culture can be performed, for example, based on the learning culture analysis methodology (Ellis et al., 1999) that provides various instruments in order to analyze knowledge-related cultural situation.

The third KM infrastructure component, IT, aims at facilitating the execution of key tasks that knowledge workers are required to perform (Davenport, 2006). KM systems provide technological platforms on which organizational knowledge activities may be managed (Davenport, 2006). As well, they provide users a channel to create, acquire, document, share, transfer and apply knowledge to meet workers' needs.

Considering the importance of knowledge audit for effective KM infrastructure design in the context of KIBP, there is a need for a comprehensive knowledge audit methodology. On the one hand, current knowledge audit methods lack the integrative triple-view of the KM infrastructure and the instruments for the information elicitation and analysis. As well, most knowledge audit methods provide general methods that are disconnected from business processes. Our research aims at bridging this gap by developing a systemic and flexible approach for knowledge audit in the context of KIBP.

Surveying exiting research regarding knowledge audit in the context of KIBP reveals two main fields of academic research – knowledge audit methods (Handzic et al., 2008; Levantakis et al, 2008; Perez-Soltero et al., 2006; Tiwana, 1999) and system modeling approaches, applying either soft (Checkland and Scholes, 1999; Mumford, 1995) or hard (Angele et al., 1998; Schreiber et al., 2000, Tu et al., 1995) thinking approaches (for a wider discussion on these two main fields see Aviv et al., 2008). These two fields may be integrated in order to provide a more comprehensive view on knowledge audit. In the next section we describe in more details the specific features of these methods that were incorporated within the developed KM audit in this research.

## RESEARCH METHOD

The research method applied in the SEKAM development is based on the method engineering approach that aims to conceptualize, develop, adapt and assemble new methods from existing ones (Jashapara, 2004). In this research, we utilized the method engineering approach in six phases, in order to assemble a comprehensive knowledge audit framework:

**Phase 1 - Setting research objective.** This phase included a literature review (Aviv et al., 2008) for establishing, in our case, key activities that should be carried out during knowledge audit.

**Phase 2 - General comparison of knowledge audit methods.** The comparison was carried out utilizing the Method Characteristics Framework (MCF) (Hackathorn, 1998). MCF is based on methods comparison within two dimensions: breadth and depth.

The breadth dimension supports identification of the main research field characteristics. Here we identified five main characteristics that influence the quality of knowledge audit in the context of KIBP: (1) Organizational Analysis - including identifying the areas and business processes with knowledge-oriented problems; (2) Knowledge Inventory within KIBP; (3) Knowledge Processes; (4) Knowledge Culture; and, (5) IT.

The depth dimension supports analysis of each of the compared methods. We adapted the analysis' depth classification to these three levels: Descriptive – the method provides only a theoretical description; Procedural – the method provides a structured 'step by step' framework; and, Practical – the method provides information elicitation and analysis instruments.

Utilizing MCF, we compared twenty knowledge audit methods and chose five of them for SEKAM development (Bright, 2007; Handzic et al., 2008; Iazzolino and Pietrantonio, 2005; Levantakis, 2008; Perez-Soltero et al., 2006). The reason for this choice lies in the fact that all five methods provide knowledge inventory analysis and at least one of the three components of the KM infrastructure. In addition, all the selected methods provide structured practical framework and theoretical description of the framework's components. Some of them also provide practical analysis instruments (Handzic et al., 2008; Perez-Soltero et al., 2006).

**Phase 3 – Meta-process model.** In this stage, we carried out a detailed analysis of the five selected methods from the previous phase, decomposing them to the model's components. SEKAM was composed of the collection of all relevant components, taking into considerations the similarities, differences and overlaps of the methods' components.

**Phase 4 – SEKAM outlining.** SEKAM assembling required representing the properties of existing methods within a common formalism. The non-standard terminology and the different labeling of similar fragments complicated the comparison. In this stage, we compared the fragments of existing audit frameworks to the main characteristics defined in phase 2. In addition, we added two extra characteristics that we identified during the literature review as important activities of any audit project: Project Management (Champlain, 1999) and Results Approval (Levantakis et al., 2008). The final established SEKAM main categories are thus: 1 - Organizational Analysis; 2 - Knowledge Audit Project Management; 3 - Knowledge Inventory; 4 - KM infrastructure; 5 - Knowledge Audit Results Approval. Table 1 provides a complete overview of all the required steps and deliverables in a knowledge audit process. In this phase we evaluated and ascribed all elicited fragments from the five methods that were found relevant to SEKAM.

### SEKAM Detailed Description

SEKAM supports analysis of organizational knowledge infrastructure by identifying and elaborating problems, opportunities, possible impacts of knowledge assets and their format and location in the context of business processes. In addition, SEKAM consists of an assessment of the current levels of knowledge usage and interchange, identification and analysis of KM activities and evaluation of the perceived value of knowledge within the enterprise. Moreover, SEKAM offers a platform for knowledge audit outcomes visualization.

Throughout the SEKAM stages' descriptions we illustrate them using a case study of knowledge audit in a large high-tech organization in the semi-conductors' field. For anonymity reasons we will further refer to the organization as ChipA. The knowledge audit took place in ChipA's architecture and algorithms department. The production of a chip involves the following stages: marketing, architecture, logic design and physical design. The audit deals mainly with the architecture and logic design and the validation processes. ChipA is a highly knowledge-intensive organization, where KM plays an important role. The extensive knowledge regarding the chip development consists of several abstraction layers from high level logical architecture to detailed physical blocks. The chip is divided to several functionality components that have to be synchronized.

### Stage 1 – Organizational Analysis

**Identify knowledge-oriented problems and opportunities.** This includes examining organizational strategy, vision and objectives, while considering environment and culture perspectives. In this stage, worksheet OM-1 from CommonKads (Schreiber et al., 2000, p. 29) can be used as an audit tool for general identification of organizational knowledge-oriented problems and enhancement opportunities. In ChipA, this sub-stage reveals several mission-critical areas with KM problems and opportunities, such as architecture design and educating new engineers (Table 2).

**1.2 Prioritize organizational problems and opportunities and select one to audit.** This analysis may involve applying several techniques such as brainstorming techniques or decision matrix (Stratton, 2004). In company ChipA, the team decides to focus on the algorithmic and logic design as the highest priority area for KM audit.

	Existing Knowledge Audit Methods					Existing Modeling Instruments	
	[11]	[3]	[22]	[15]	[13]	Social	Engineering
<b>Stage 1 – Organizational Analysis</b>							
1.1 Identify areas with knowledge oriented problems and opportunities			< 1.1; 1.3	>> 1.1 1.2			OM-1 [21]
1.2 Prioritize areas and select one to audit		= 1		< 1.3		Brainstorming [23]	decision matrix [23]
1.3 Identify key stakeholders involved in the selected area		< 3		> 2,2			
1.4 Identify core business processes in the selected area			= 2.1; 3.1	< 3.1			OM-1 [21]
1.5 Prioritize core processes and select specific process to audit		< 2	< 3.2			Brainstorming [23]	decision matrix [23]
<b>Stage 2 – Define Audit Project of Specific Business Process</b>							
2.1 Define outcome				< 1.4		PMBOK [20]	
2.2 Define time							
2.3 Define resources							
<b>Stage 3 – Knowledge Inventory of Business Process</b>							
3.1 Identify pivot employees involved in the selected business process		= 3	= 4.1	= 3.2			
3.2 Identify process environment					>> 1.5 1.6	CATWOE [4]	OM-2 [21]
3.3 Define process flow chart diagram		< 4					OM-3, TM-1 [21]
3.4 Analyze formal knowledge inventories within process	>> 5	< 5	< 5.1	< 5.1			OM-4, TM-2 [21]
3.3 Analyze informal knowledge interactions that occur within process			< 5.2	< 5.3		"Rich Picture"[4]	Flow chart diagram
<b>Stage 4 - KM Infrastructure of the Business Process</b>							
4.1 Analyze knowledge related culture	< 4					comparison study based on existing frameworks	
4.2 Analyze knowledge processes	< 4	<5	<5.2	< 3.4	< 1.2		
4.3 Analyze knowledge related IT					> 1.2; 2.1	field analysis of IT capabilities	
<b>Stage 5 – Results Approval</b>							
5.1 Write knowledge audit report	>> 6	< 6	=6.1	= 7.1			OTA – [21]
5.2 Receive comments from decision makers		< 6		< 7.2			
5.3 Carry out results validation			< 6.2				
5.4 Audit completions							

'=' - the activity in the existing method is equivalent to SEKAM;  
 '>' - the activity in the existing method does more than SEKAM;  
 '<' - the activity in the existing method does less than SEKAM;  
 '><' - a part of activity in the existing method overlaps a part of SEKAM;  
 blank - the activity is absent from the existing method.  
 [i] – reference No. i

**Table 1:** SEKAM outlining

**1.3 Identify key stakeholders involved in the chosen area.** Key stakeholders are usually managers, leaders or experienced workers who help the team to identify core business processes within the chosen area. In ChipA, several key stakeholders are

involved in the algorithmic and logic design process: the marketing people, who deliver the customer requirements, and the physical designers, who create the chip according to the design.

Organization Model	Problems and opportunities (OM-1)
Problems and opportunities	<p><i>Problems:</i> It is hard to find knowledge across design component boundaries, since many of the chips' design processes are not documented, and design architects hold the knowledge regarding these processes.</p> <p>Training new engineers require a very long period, and afterwards engineers don't have a broader context understanding of the design process they are involved with.</p> <p><i>Opportunities:</i> KM enables engineers to better handle and accelerate their core design processes.</p> <p>KM will shorten the new engineers' training phase, which will make them productive in less time.</p>
Organizational context	<p><i>Mission</i> - The organization's mission is to deliver state of the art chips, on time and in competitive price. The organization operates in a competitive and dynamic environment with rapid development of new innovations.</p>
Solutions	<p>Utilizing the presentations for training. Utilizing Web2.0 tools, knowledge-related visual tools. Creating a combined knowledge manager and architect role. Developing a community of practice around each design component.</p>

**Table 2:** ChipA OM-1 form

**1.4 Identify core business processes in the selected area.** These include activities and processes which are mission-critical, knowledge-intensive, and require knowledge audit. In ChipA the mission-critical processes that were identified are the chip design process and new engineer training.

**1.5 Prioritize core processes and select a specific business process to audit.** Based on the business processes identified in sub-phase 1.4, in ChipA, the chip design process was chosen as the first business process to be audited.

### Stage 2 – Define Audit Project Properties.

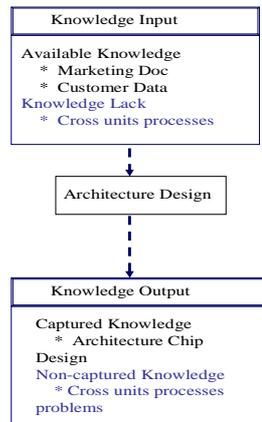
In order to provide a high-quality and consecutive audit process, it needs to be managed as any other organizational project, managing budget, schedule and scope—the “triple constraints” of project management (P.M.I., 2004). The key disciplines of project management, such as risk management, change management and monitoring, also have to be handled during the knowledge audit project. The detailed guidance for carrying out these activities can be found in PMBOK (P.M.I., 2004). In ChipA the project team defined the vision, mission and goals of the project, as well as the project's outcomes, time-table, budget, and potential risks.

### Stage 3 – Knowledge Inventory of the Business Process

**3.1 Identify pivot employees involved in the chosen business process.** The ChipA managers are asked to identify two designers, one marketing manager and one physical engineer involved in the chip design process, for participating in the audit.

**3.2 Identify business process environment.** Here, a high level process description has to be prepared, including identifying process flow, environment and characteristics. This enables the audit analyst to profoundly explore the process environment, people involved, knowledge resources used during the process execution and cultural elements. The audit tool in this step is an adapted worksheet that integrates the OM-2 (Schreiber et al., 2000, p. 31) worksheet from CommonKads and the CATWOE checklist from SSM (Checkland and Scholes, 1999, p. 325-326). This combined worksheet provides an enhanced analytical tool for high level description of audited business process. Table 3 demonstrates a high-level analysis of decisive elements within the chip design process that require detailed audit and have influence on the KM solution design.

**3.3 Define business process workflow.** In ChipA the audit analyst defined in details the workflow of the chip design process in terms of the tasks it is composed of, using worksheets OM-3, as partially demonstrated in Table 4. Organizational assets were termed propriety documents. Next we used worksheet TM-1 (Schreiber et al., 2000, p. 47) as illustrated in Table 5, for each chip design task, in order to gain detailed knowledge-oriented analysis for each task. Finally, the combination of OM-3 and TM-1 generated the ChipA chip design process flow chart partially illustrated in Figure 1.



**Figure.1.** Example of knowledge inventory diagram within architecture chip design

Organization Model	Variant Aspects
Customers	Customers, market engineers, physical designers, validation engineers, CAD software engineers.
Actors	Logic designers, architecture designers.
Transformation	Input: marketing documents, theoretical documents, process documents. Output: Architecture and logic documents.
Worldview (importance)	To accelerate the chip design process, while managing the cross components knowledge.
Owner	ChipA company – Architect department director.
Environment	Competitive firms, quality requirements, cost and time constrains, large amounts of complex and detailed data, cross units knowledge.
Structure (departments)	Marketing ->Architecture->Logic Design->Physical Design  <div style="text-align: center;"> <p>Validation</p> </div>
People	Market engineers bring the customers’ requirements.
Resources	Information systems, ChipA IP, ChipA professional workers.
Culture & power	On the one hand ChipA is characterized with openness where every employee can express his thoughts equally. On the other hand there is hard discipline and and people gain authority based on their skills and roles.

**Table 3:** Integrated CATWOE+OM-2 analysis for ChipA Chip Design process

No.	Task	Performed by (agent)	Where? (location)	Knowledge assets	Knowledge Intensive?	Significance
1	Algorithm design	Engineer/Component Manager/	Organization unit	Propriety documents, theoretical documents	Yes	High
2	Cross components follow-up	Responsible Architect, organizational customer	Cross Organization	Propriety documents, theoretical documents	Yes	High

**Table 4:** Chip Express – Chip design tasks OM-3 worksheet

Task	No. 1
Goal and Value	Prepare chip architecture design document. Its main goal is to map customers' requirements into algorithms that the chip can execute.
Dependency and Flow	Preceding Task – Request form marketing engineers. Follow-up Tasks – Approval from the component manager,
Personal Skills and Competence	Formal knowledge on chip design and cross components process. Who are the most experienced architects that can provide assistance on cross components processes?

**Table 5:** Knowledge description of the tasks within the ChipA - chip design - TM 1

**3.4 Analyze knowledge inventory within the business process.** This includes in-depth analysis of the knowledge assets involved in the audited business process, using the knowledge assets analysis worksheet OM-4 (Schreiber et al., 2000, p. 33) and worksheet TM-2 (Schreiber et al., 2000, p. 49). OM-4 worksheet (Table 6) provides the description of the knowledge assets of the chip design process. The next step is generating a knowledge inventory diagram, developed in this research and demonstrated in Figure 1, which indicates input and output of knowledge items' inventory for each task in a specific process flow chart.

No.	Knowledge Asset	Possessed by Agent	Used in Task	Right Form? Yes/no	Right Place? Yes/no	Right Time? Yes/no	Right Quality? Yes/no
1	Marketing document	Market engineers	1	yes	yes	yes	yes
2	Architecture design document	Design architectures	1,2	no	yes	yes	no
3	Cross components process knowledge	Design architectures	1, 2	no	no	no	no

**Table 6:** Knowledge assets of the ChipA - OM-4 worksheet

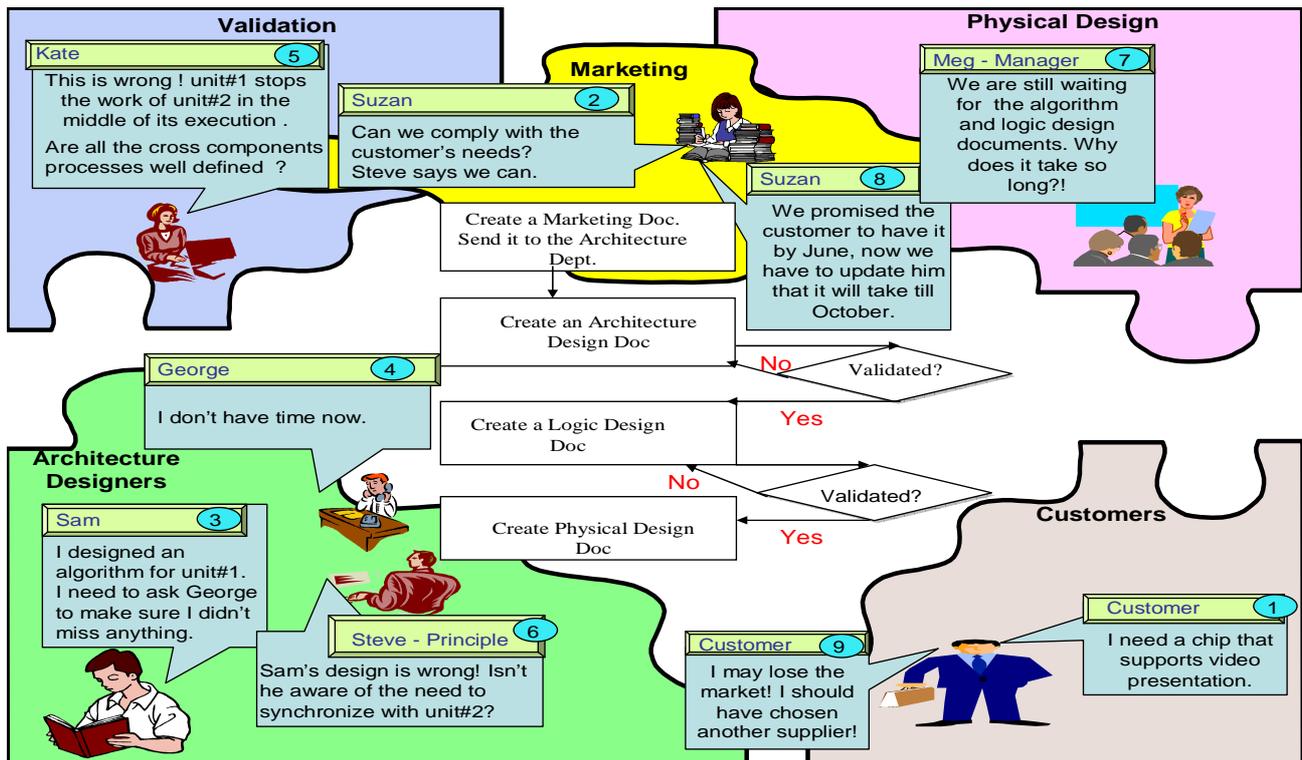
The knowledge input analysis is based on exploring all available organizational knowledge sources. According to the CommonKads worksheet OM-3, the analyst can prepare a table which maps each knowledge item to its sources and analyzes specific items by the next questions: Is it the right quality? right form? right place? right time? In addition, the analysis should include available knowledge sources and knowledge lacks. Further, the analysis should include knowledge output

analysis for each of the process stages, exploring the form of knowledge creation, capture and storage. It is important to examine the nature of the digital resources where knowledge is stored: external / organization / department / team level. Following the example, a Knowledge Inventory Diagram for the chip design process' steps is defined. For each revealed knowledge item the item is analyzed. Additionally, the analyst can explore tacit knowledge sources through the adapted agent model worksheet AM-1 (Schreiber et al., 2000, p. 50). TM-2 worksheet includes for each knowledge asset (presented in OM-4) its specification (see Table 7).

Knowledge Asset No.	3
Nature of the knowledge	Critical for integrating several components
Form of the knowledge	Mostly kept in expert architects' minds.
Availability of knowledge	Low

**Table 7:** Specification of the knowledge employed for a task chip design – TM-2

**3.5 Analyze informal knowledge interactions within the process.** Various informal interactions involving knowledge transfer are expressed through an informal knowledge interaction diagram that can be understood by various stakeholders. This diagram is the integration of the Rich Picture modeling of SSM with the process workflow. Figure 2 presents knowledge lacking in the process of a chip's architectural design that causes the validation process to fail, hence delaying the supply of the chip to the customer. In this example, the young designer (Sam) is unaware of the need to synchronize between unit#1 and unit#2. Since the relevant knowledge exists only in the minds of the expert engineer (George) and his manger (Steve), both hard to get, Sam designs the units badly. The numbering represents the sequence of the social interactions in the context of the process flow. While the knowledge problems were discussed in the previous stages, this illustration presents an integrative view of the knowledge barriers and their business outcomes, in this case the possibility of losing a client.



**Figure 2:** Illustration of knowledge problems within the chip design process

**Stage 4 - Analyzing the KM infrastructure of the Business Process**

In order to analyze the KM infrastructure components, organizations may select an existing framework that fits their particular set of circumstances. For example, the data elicited in the previous stages can be analyzed utilizing methods such

as KPPP (McElroy, 2003), OLM (Ellis et al., 1999) or learning culture analysis methodology (Ellis et al., 1999). In ChipA, we identified the next KM infrastructure components of the RFP process: 1) Knowledge processes – codification, storing, sharing, applying, maintenance; 2) Culture – interpersonal trust and valid information. For each of these KM infrastructure components we produced the detailed analysis description of the current situation and the high-level proposal for the required improvements. To summarize the results of this stage, SEKAM utilizes the OTA-1 worksheet (Schreiber et al., 2000) that provides impact analysis of organizational knowledge activities, as illustrated in Table 8.

Organization Model	Checklist for feasibility decision document
Impacts and changes in the organization	<p><i>Knowledge Policy</i> – There should be a reform in the organizational knowledge management. The knowledge needs to be organized in a hierarchal structure for enabling browsing in different levels of details.</p> <p><i>Knowledge Format</i> – Cross organizational knowledge platform; Process knowledge platform; Training outline for new engineers.</p>
Task/Agents-specific impacts and changes	<ol style="list-style-type: none"> <li>1. There will be an integrative web portal where all the current chip design material will be available.</li> <li>2. The chip design knowledge will be organized according to the chip’s components.</li> <li>3. The web portal will include cross components process knowledge, including cross process management.</li> </ol>
Attitudes and commitments	<p>Several of the chip design team members refuse to handle the chip design material via a web portal instead of their personal desktop. For overcoming this barrier:</p> <ol style="list-style-type: none"> <li>1. A web portal course will be provided to the chip design staff.</li> <li>2. Measurements will be controlled and provided to illustrate the knowledge portal benefits in terms of engineers’ work hours saving, delays in the project time line etc.</li> </ol>
Proposed actions	<ol style="list-style-type: none"> <li>1. <i>Improvements</i>: Chip design will be handled in a collaborative environment.</li> <li>2. <i>Accompanying measures</i>: Chip design portal usage, chip design staff satisfaction, chip design performance measures.</li> <li>3. <i>Expected results</i>: Shorter chip design time-to-market, shorter training period, sharing knowledge among chip design staff.</li> </ol>

**Table 8:** ChipA audit summary – OTA-1 worksheet

### Stage 5 – Audit Results Approval

The KM analyst and the business managers review and approve the audit results (OTA-1) and decide about the next step – KM project that includes solution detail design, development and implementation. The ChipA managers can examine the implementation of the chip design web portal as a collaborative environment and whether it enhanced the chip design business process. During the next KM phases they may apply a similar solution to other business processes.

### CONCLUSION

Knowledge management has become an important driver for business processes’ design or reengineering in knowledge-intensive organizations. In this paper, we suggest a methodology for eliciting and analyzing KM infrastructure requirements in the context of KIBP, towards enhancing the KIBP with embedded knowledge solutions. While knowledge is a human-based resource that requires a social-oriented approach (Fennessy and Burstein, 2000), managing it, including formal and systematic capturing and organization of knowledge, requires an engineering approach (Schreiber et al., 2000). To this aim, SEKAM provides an integration of both aspects – human and engineering – for analyzing KM infrastructure solution requirements. In addition, visualization techniques of both approaches, engineering and social, are integrated to a coherent visual representation of the results obtained within SEKAM. This visualization is aimed at supporting various stakeholders in understanding the knowledge audit outcomes and the redesigned KIBP that address the KM requirements. SEKAM is based on existing, already validated, methodologies and tools and thus can be theoretically justified. Nevertheless, examining the actual added value of this combined approach in broader settings is important. Future work will focus on applying and

validating the suggested methodology within a high-tech (thus knowledge-intensive) organization, reengineering and embedding KM solutions into KIBP, and evaluating the actual benefits.

**ACKNOWLEDGEMENT:** This work is supported by funding from CA Labs, CA Inc.

## REFERENCES

1. Angele, J., Fensel D., Landes, D. and Studer, R. (1998) Developing knowledge-based systems with MIKE. *Journal of Automated Software Engineering*, vol. 5, issue 4, pp. 389-418.
2. Aviv, I., Levy, M. and Hadar, I. (2008) Socio-Engineering Knowledge Audit Methodology (SEKAM) for Analyzing End-User Requirements. *Proceedings of OSRA EIS&KM, International Conference of Information Systems (ICIS) 2008*, Paris, France.
3. Bright, C. (2007) A pragmatic approach to conducting knowledge audit. *International Conference on Knowledge Management*, Austria.
4. Champain, J. J. (1999) *Auditing Information Systems*, Second Edition. John Wiley and Sons, Inc. (2003)
5. Checkland, P., Scholes, J.: *Classic Book Review: Soft Systems Methodology in Action: A 30-year Retrospective*. John Wiley & Sons.
6. Davenport, T. (2006) *Managing Knowledge Workers: Developing Capabilities*,. <http://www.babsoninsight.com/contentmgr/showdetails.php/id/852>
7. Ellis, S., Caridi, O., Lipshitz, R., Popper, M. (1999) Perceived error criticality and organizational learning: An empirical investigation. *Knowledge and Process Management*, vol. 6, pp. 166-175.
8. Ellis, S., Shpielberg, N. (2003) Organizational learning mechanisms and manager's perceived uncertainty. *Human Relations*, vol. 56, issue 10.
9. Fennessy, G., Burstein F. (2000) Using soft systems as a methodology for researching knowledge management problems. *International Conference on Systems Thinking in Management*, Geelong, Australia.
10. Hackathorn, R. D., Karimi, J. (1988) A Framework for Comparing Information Engineering Methods. *MIS Quarterly* vol. 12, issue 2, pp. 203-220.
11. Handzic, M., Lagumdžija, A., Celjo, A. (2008) Auditing knowledge management practices: model and application, *Knowledge Management Research and Practice*, vol. 6, pp. 90-99. (2008)
12. Hylton, A. (2002) *Measuring & valuing knowledge: role of the knowledge audit*. Knowledge audit Publications.
13. Iazzolino, G., Pietrantonio, R. (2005) *Auditing the Organizational Knowledge through a Balanced Scorecard-based Approach. KMAP 2005*.
14. Jashapara, A. (2004) *Knowledge Management: An Integrated Approach*. Prentice Hall.
15. Levantakis, T., Helms, R., Spruit, M. (2008) Developing a reference method for knowledge auditing. *Lecture Notes in Computer Science*, Vol. 5345, pp. 147-159.
16. Lustrì, D., Miura, I., Takahashi, S. (2007) Knowledge management model: practical application for competency development. *The Learning Organization Journal*, vol. 14, issue 2, pp. 186 – 202.
17. McElroy, M. W. (2003) *The new knowledge management: complexity, learning, and sustainable innovation*. Butterworth-Heinemann, Burlingt.
18. Mumford, E. (1995) *Effective Requirements Analysis and Systems Design: The ETHICS Method*. Macmillan.
19. Nonaka, I., Takeuchi, H.: (1995) *The Knowledge-Creating Company How Japanese Companies Create the Dynamics of Innovation*. Oxford Press.
20. P.M.I. (2004) *A Guide to the Project Management Body of Knowledge: (Pmbok Guide)*. Project Management Institute.
21. Perez-Soltero, A., Barcelo-Valenzuela, M., Palma-Mendez, J. T. (2006) Knowledge audit methodology with emphasis on core processes. *European and Mediterranean Conference on Information Systems*, Spain.
22. Schreiber, G., Akkermans, H., Anjewierden, A., de Hoog, R., Shadbolt, N., van de Velde, W., Wielinga, B. (2000) *Knowledge Engineering and Management - the CommonKADS Methodology*. MIT Press.
23. Sivan, Y. Y. (1999) A Modern Knowledge KM infrastructure: Properties and Capabilities. *WebNet Journal*, vol. 1, issue 3, pp. 18-21.
24. Stratton, M. J. (2004) *Business case development and analysis. CBUC04 - Proceedings of the Crystal Ball User Conference*, Colorado, USA.
25. Tiwana, A. (1999) *Knowledge Management Toolkit*. Prentice Hall.
26. Tu, S. W., Eriksson, H., Gennari, J. H., Shahar, Y., Musen, M. A. (1995). The application of PROTÉGÉ-II to protocol-based decision support. *Artificial Intelligence in Medicine*, vol. 7, issue 3, pp. 257-289.