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PROCESS APPROACH TO KNOWLEDGE MANAGEMENT

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Abstract: The article points out the limited availability of practical implementation guidelines, methods and tools as one of the core issues in the widespread usage of knowledge management (KM) in organizations. The process approach is proposed as an efficient way to understand the scope of knowledge management and to plan its development or improvement, in line with organizational strategy. The role of information technology (IT) in supporting knowledge management is emphasized and key functional groups of IT systems are listed. A sample section of the detailed process model is presented for the KM resource identification master process, with a BPMN graphical visualization. Both the process model and the detailed specification of IT systems supporting knowledge management are considered by the author as complex structures that require to be hosted in a dedicated support environment. Key assumptions of a tool, named KMBoost, are outlined to show how a simple, but interactive toolset can foster the understanding and usage of the KM process model. In the concluding remarks a high level SWOT analysis of the KM process model and the KMBoost tool is conducted.

Key words: organizational knowledge, knowledge management, knowledge activities, knowledge management model, process model, process hierarchy, process approach to knowledge management, process visualization, business process modeling notation (BPMN), process evaluation and scoring.

1 Foreword

The concept of knowledge management (KM) receives constant attention from the world of science, mainly in the area of organizational management and information systems. This attention is well reflected in the number of publications and information technology (IT) solutions or development platforms available on the market[1]. The potential benefits of proper knowledge management are very appealing, as they influence all dimensions of the balance sheet and the profit and loss statements[2]. The promise of higher revenues, lower costs as well as the optimized capital and resource structure is hard to reject by contemporary managers, pressured to deliver strong bottom-line results, despite turbulent economic conditions.

In the world of business it is rather easy to identify organizations that either consider themselves as "knowledge based" or undertake various initiatives aimed at addressing knowledge issues. Such initiatives usually involve an introduction of specialized technologies, designed to better support the organizational life cycle of knowledge. Technology implementation projects are typically expected to bring breakthrough performance improvements, serving as a universal and comprehensive remedy for a wide range of knowledge management topics. The research of L. Prusak[3], conducted on the population of 220 IT projects in knowledge management, shows that at least half of these initiatives failed to meet their objectives, mainly due to the disconnection between the system features and the strategic agenda (Bergman [2], p. 2). Since the ultimate goal of knowledge management is to support the execution of the strategy adopted by the organization, KM initiatives that fail in this respect may be considered a waste of time and resources.

The study of literature hardly provides any evidence or opinions that knowledge management in general is not worth pursuing. At the same time, it is not easy to find practical guidelines, methods and tools that allow for organizations to comfortably embark on the knowledge management journey. The potential of knowledge management is recognized and praised, but its scope and the implementation path remains unclear, often being dangerously simplified and reduced

[1] The author conducted a study of IT systems that were being classified as "supporting knowledge management". Already in 2007 the list included 1170 solutions that offered support for selected KM activities.

[2] Based on the authors' research, the highest impact is expected with respect to the optimization of costs.

[3] The Director of the IBM Institute for Knowledge Management. Source: http://www.ibm.com.

to the introduction of a technological solution[4]. In other words, the key issues today seem to be the "what" and "how" of knowledge management. One may say that the "what" is not questionable as there are many definitions of knowledge management available[5]. The definitions however are insufficient, if they are not followed by practical, proven and detailed methods and tools[6]. Obviously, the better we define "what" the content of knowledge management is, the easier it is to define the "how" part of it, in the context of an individual organization.

Based on the research on the definition of knowledge management[7], the author concluded that 70% of definitions specify KM as a process or a set of organizational activities. There were 234 descriptors used in the definitions, with about 70% related to knowledge: creation, usage, identification, sharing, acquisition, organizing and capturing. The study showed that the mainstream archetype of knowledge management has a process nature. Such a situation justifies the usage of the process approach to analyzing knowledge management ("what") and to developing practical implementation solutions ("how"). This paper provides a proposal of a process model of organizational management, together with a view on how this model can be used by managers who target a systematic approach to improving the KM system in their organizations.

2 Process Approach to Knowledge Management

The process approach to business engineering has its historical roots dispersed across various sources and management schools. Putting the history aside, the plethora of opinions on process management is solidified and organized under the ISO 9001 standard[8]. ISO9001 states that organizations should be viewed as a series of interlinked processes which must be identified, described, marked with performance criteria, measured and last but not least - improved, in a continuous fashion. This approach was widely adopted by leading manufacturers who concentrate on the quality gains possible to achieve via process thinking combined with a detailed statistical analysis of performance[9]. Process analysis is also the methodological foundation for consulting companies, that happen to be some of the most advanced knowledge based organizations.

One of the key success factors in usage of the process model, internally or in assisting other companies, is the drive to understand the complexity behind the organizational activity. As the inscription on the Delphi Oracle states[10] - *nosce te ipsum* ("know thyself") - understanding ourselves is the true key to predict one's future. The process approach places special attention on the understanding of "what" is being done, in order to propose a better way on "how" to do it. Such an explanation might sound trivial, but in fact its simplicity can be seen as a significant advantage. There are usually no golden, universal solutions that can be applied to any organization. That is why we must dedicate enough energy to the understanding of the organizational processes in order to identify the true value chains and focus on their optimal design.

As described in the introduction, knowledge management can also be considered a system of interlinked processes. By compiling various popular and specialized[11] views on knowledge management, and building upon the process model of G. Probst [15], the following definition of KM can be proposed: knowledge management is a systematically organized and integrated set of processes, aimed at the optimal usage of knowledge resources, in a broadly defined decision taking.

The main processes of knowledge management include:

- knowledge resource identification,
- analysis of knowledge resource usability for the organization,

[4] IT failures due to misunderstanding of processes also highlighted in ([11], pp. 12-14 „Principle 5").

[5] In a brief research exercise the author easily collected over 100 various definitions of knowledge management.

[6] Author's view is fully in-line with the opinion of A. Buono, about the mismatch of theoretical work and the actual needs of business operators ([3], 2000, eBook - Chapter 14).

[7] 68 definitions of KM were selected for a detailed, semantic study to identify shared and specific elements.

[8] International Organization for Standardization (www.iso.org).

[9] E.g. the Six Sigma or Lean concepts.

[10] Source: [1].

[11] In the „popular" category we place concepts such as the widely discussed "spiral of knowledge" of Nonaka/Takeuchi [12]. The less popular, but very interesting views include the work of M. Nissen on the knowledge cycles [11].

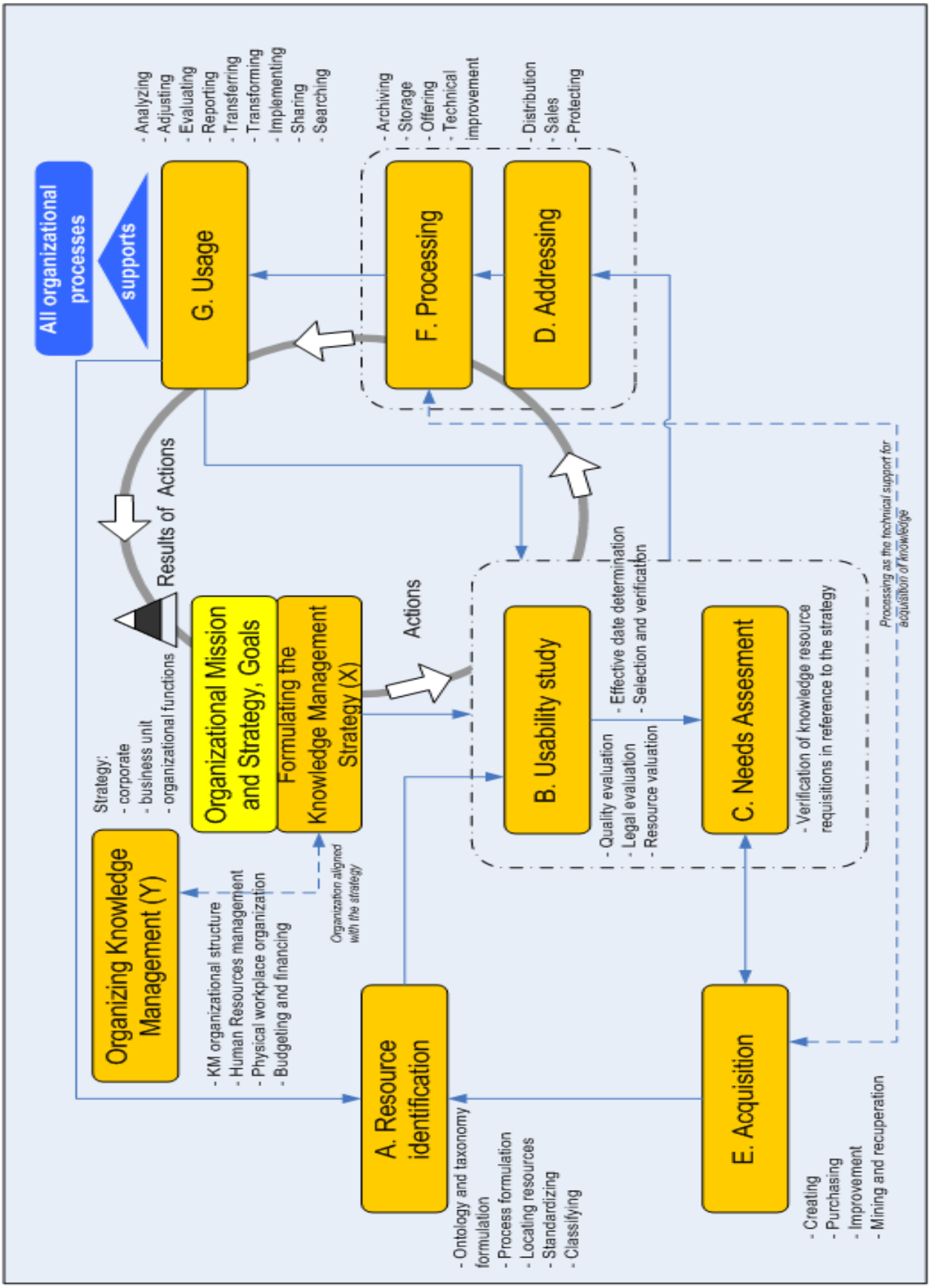

Figure 1. Key processes in knowledge management
(source: self study)

- analysis of knowledge needs/requirements,
- addressing of knowledge resources,
- acquisition of knowledge resources,
- processing of knowledge resources,
- usage of knowledge resources.

It is important to mention that in this view we emphasize the role of verifying the usability of knowledge resources and the necessity to study the knowledge needs of an organization.

These two elements, not explicitly seen in other models must not be overlooked, as we can easily find examples of organizations that consume their energy on either processing of knowledge that is no longer needed or generate knowledge resources in separation from the needs outlined in the strategy.

A graphical representation of the above definition (see Fig. 1) is enriched with a network of flows or relationships between the main processes of knowledge management[12].

In addition to the seven key KM processes, the diagram contains two additional processes: formulating the knowledge management strategy (X) and organizing knowledge management (Y).

These two processes are not specific to KM and are shared with other areas of organizational activity, such as production, client service or human resources management. All of the elements of any human activity must have their individual strategy (linked to the overall mission, strategy and goals) and must be properly setup by organizing the necessary resources, tools and systems as well as processes and procedures. The X and Y processes are therefore added only to complete the setting of knowledge management within the organizational context, but they are not subject to a detailed discussion.

The starting point of knowledge management is the transformation of the organizational mission, strategy and goals into a clear knowledge management strategy. The three key processes that are linked to the defined KM strategy are resources identification (A), the usability study (B) and the needs assessment (C).

Once the KM strategy is formulated, an organization needs to find answers to the questions of "what do we need", "what knowledge resources are already available" and "how useful are the current resources to support the strategic direction". Taking into account the dynamic market conditions that influence most organizations on global and local markets, the demand for knowledge resources is very high and subject to frequent changes. The necessity to remain adaptive to environmental changes is one of the reasons behind the inability to maintain the equilibrium between the resources held and the actual needs.

The efficiency of interaction between the A, B and C processes has a profound impact on the remaining elements of the KM system in an organization. The needs assessment triggers knowledge acquisition processes (E). At the same time the identified (A) and useful (B) resources are being addressed (D) to the organizational units and further processed (F) and used (G) in all activities of the organization, leading to the execution of the strategy. If the processes of identification (A), usability study (B) and needs assessment (C) are not properly managed, it is possible that the organization will be operating without the necessary knowledge resources, while simultaneously dealing with resources that are not needed to execute the strategy. Taking into account the high cost of knowledge resources (human capital, systems and tools), it is very important to assure that all units "get what they want" and "want what they get", focusing on value generation and not maintaining legacy, redundant knowledge resources.

The diagram also shows a number of feedback loops that link the processes by providing a higher integration of knowledge management. For example the usage of knowledge resources (G) might lead to discovering some resources that were not located by the identification process (A). Usage (G) is also a sanity check of usability (B), verifying the quality of resources and possibly proposing their delivery in another form (e.g. aggregated, analytical, available more or less frequently).

The proposed model of key processes in knowledge management provides a solid, high-level base for defining the scope of KM. It is a theoretical framework upon which we can build a practical view of what knowledge management truly is. High level descriptions of KM are omnipresent in publications, but they do not support organizations in the implementation or improvement of their KM systems.

[12] This representation may be considered more pragmatic as compared with other models, where the principal set of relationships is described as "many-to-many" set between all key processes.

The most natural way to define the detailed scope of knowledge management is to describe the next levels of processes, attached to the main 7 processes of knowledge management, as described above. This further decomposition allows to move the discussion to the level of activity groups that can be recognized by managers as something they already perform or should possibly start practicing.

In addition to the pure identification of detailed knowledge management processes, the detailed analysis also allows to capture the relationships and dependencies existing between KM components, as well as the flows of artifacts and knowledge resources.

3 Detailed Map of Knowledge Management Processes

There are several primary challenges related to the definition of a detailed map of knowledge management processes. First of all the availability of existing publications and research that reflect a similar detailed view on KM is limited[13]. Second, knowledge management is very tightly linked to the applications of information technology (IT) and as such cannot be analyzed without a good view on the functionalities of IT systems and solutions commonly used. Then we cope with the issue of organizational variety and the ability to provide a standardized view on knowledge processes regardless of the type, form, purpose, size, composition or other morphological features of an organization. These challenges provide a strong stimulus to develop a detailed process model that might provide valuable insights into the process nature of knowledge management.

The detailed KM process map can be developed by combining various available information sources and experiences into a single process framework, following the high level outline of key knowledge processes, presented in chapter 1.

Based on this outline, a method used by the author covered 5 steps:

1) selection of a notation to document the KM processes, based on available process graphing and visualizing standards,
2) first view on KM detailed processes, based on self experience and overall literature studies,
3) semantic analysis of KM definitions and models, mapping of KM activities,
4) combination of results of steps 2-3 with the output of the IT systems study to form a final, detailed process map,
5) development of process diagrams to reflect the relationships between processes on levels 1 and 2 of the hierarchy.

In step 1, the Business Process Modeling Notation (BPMN[14]) was selected over other choices (such as the Unified Modeling Language/UML or the Extensible Markup Language Based Process Definition Language/XPDL). The selection of BPMN was mainly due to the ability to reflect the desired level of detail, focus on the business perspective (not IT oriented), relative simplicity and overall compliance with other standards, allowing for further development of any process models built with BPMN.

A first list of sub-processes was compiled in Step 2, already showing over 100 processes linked to the 7 key KM processes. In step 3, a semantic analysis of 68 knowledge management definitions and 10 models was conducted to develop a list of KM activities, understood as processes on various levels of the process hierarchy. A total of 396 KM activities were gathered, among which 119 were unique. The set was optimized by reducing the synonyms (such as “utilization” and “usage”), leaving 45 KM activities. These activities may alternatively be viewed as operations executed on knowledge resources (see Table 1).

Step 4 covered the combination of results obtained in steps 2 and 3 with outputs of a parallel research on IT systems classified (by their authors or certification bodies) as supporting knowledge management. The focus of the research was to make an inventory of system functionalities and map them onto the process model in order to see which processes are properly supported by available IT tools.

In the first stage of the study, a list of 1170 knowledge management systems supporting KM was composed, based on leading industry listings (e.g. [4, 7, 9 and 16]) displaying together 937 items, and the web research producing 233 further items.

[13] Valuable research and audit input found in [5, 6, 7, 8, 10 and 11].

[14] See [13] for the specification of the standard and [14] for examples.

Table 1. Unique knowledge management activities in KM definitions and models
(source: self study)

Unique knowledge management activities In KM definitions and models		
- acquisition	- implementing	- reuse
- adding context	- improving	- searching
- analyzing	- increasing adapting	- securing
- archiving	- internalizing	- securing
- capturing	- interpreting	- selecting
- certifying	- learning*	- selling
- classifying	- localizing	- sharing
- coding	- maintaining	- staging
- compressing	- maximizing usage	- storing
- creating	- measuring	- transferring
- distributing	- organizing	- transforming
- externalizing	- personalizing	- updating
- forecasting	- publishing	- using
- fusion	- quality evaluation	- valuation
- identifying	- restoring	- verifying

* In organizational experiences we also identify the term "de-learning", which is related to removal of old practices that are a source of suboptimal efficiency.

The list was optimized via a series of adjustments, related to duplicates (e.g. due to slightly different naming or spelling mistakes in the lists), removal of solutions listed as "supporting KM", but being rather universal (e.g. Enterprise Resource Planning/ERP), removal of solutions that despite the listing could not be found (possible closure of business) or integrating systems that were merged by company acquisitions and integrated under a single name.

After the optimization, the list was reduced to 907 items. Based on a high level study of the functionalities of the systems, an initial classification of 31 functionality groups was proposed. Examples of such groups include: content acquisition, content management, collaboration or meta data management.

In the next step a selection of 10 most often mentioned or discussed IT systems was made as a sample for a detailed functional study, based on system documentation and consultations with system vendors. As a result of working only with the initial research population (10) the number of unique functionalities, on various functional levels, went up from 31 to 120. Since the dimensions of the research were quickly increasing in value, the study was limited to 116 systems that were analyzed on a detailed functional level. The end result of the study produced a functional map with 67 main functional groups (see Table 2) and 245 subgroups in a maximum 3 level hierarchy.

The system study performed in step 4 allowed to significantly extend the understanding of various knowledge management processes that are in use by organizations. Some of the processes became visible from the perspective of particular business domains such as the data protection in the public sector or the constant capture of selected medical information on patient behavioral patterns.

Other processes were clarified or defined, beyond their plain keyword character (e.g. authoring as a process consisting of multimode and multiparty generation of content, where aspects of localization, translation and versioning are taken into account). The resulting process map contains 88 second level processes and 174 third level processes, all organized in a hierarchy linked to the 7 key knowledge management processes.

Table 2. Main functional groups of knowledge management supporting systems
(source: self study)

Main functional groups of knowledge management supporting systems		
- Abstracting Services - Independent Summarization and in Search Functions - Analytical Applications (Business Intelligence, Analytics, Corporate Performance Management, Insight generation) - Archiving (Revision-Proof), including Email Archiving - Author Management - Authoring Tools - Blogging (Blog) - Business Activity Monitoring - Business Process Management (Process Engine, Process Automation) - Case Management - Catalog Management - Collaboration - Resource Sharing - Collaboration - Scheduling (People, resources, calendar) - Collaboration and communication - Competitive Intelligence - Compliance Management - Content Management System - Content Acquisition (Capture, Input Management) - Content Delivery (Distribution, Publishing, Output) - Content Indexing (Categorization, Classification, Tagging) - Content Information Quality	- Content Store (Warehousing and Infrastructure) - Content/Data Integration - Continuous Archiving of Personal Experience (CARPE) - Digital Asset Management - Digital Rights Management - Document Management - Dynamic Document Control - eLearning (Learning Management System) - Email Management - Expert Management (identification, search, ranking, evaluation) - Expert System (Decision Support System) - Forms Management - Graphical Knowledge Modeling - Help Desk Management - Idea Management (Suggestion Box) - Identity Management - Image Management (Imaging) - Information Extraction (Knowledge Elicitation) - Information Rights Management - Knowledge Activity Monitoring - Lifetime Personal Information Management - Metadata Management - Personal Knowledge Management (also Networked)	- Policy management - Portal - Print management - Project Management - Questions and Answers - Real Time Data Feeds (RSS) - Records Management - Reference System - Regulation Change Information - Reporting (Enterprise Reporting, Reports management) - Repurposing (Rendering, Editorial Component) - Retention Policy Services - Rich Media Search - Search and Retrieval (Search Relevance) - Security Assurance - Semantic Web - Taxonomy Management - Terminology Suite - Text Mining and Analytics - Topic Maps - Version Control (also de-duplication) - Web Content Management - Wiki/Wikipedia - Workflow

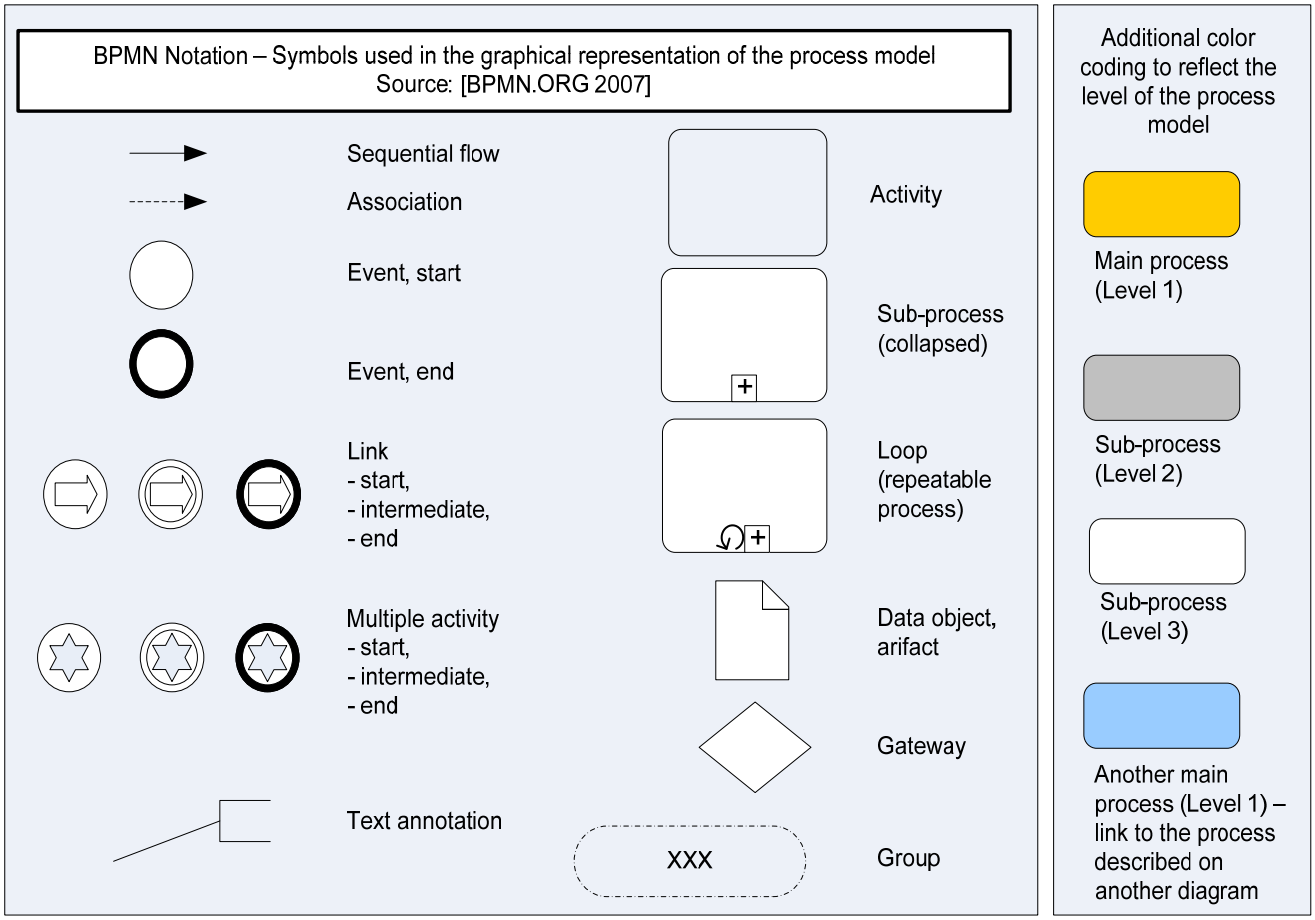

Figure 2. Elements of the BPMN used in KM process modeling
(source: [13])

The structure was compared with a best practice example from a large scale process modeling activity in the area of retail banking[15].

The knowledge management model with a hierarchy of 7-88-174 processes on each of the 3 levels (2%-33%-65% in a percentage view) was similar to the retail banking model showing the structure of 7-47-232 (2%-17%-81%) processes on each level.

Taking into account the fact that the retail banking process hierarchy was proven to successfully support business reengineering activities of several organizations, it was assumed that the proposed hierarchy of KM processes also holds the potential for practical use in the KM process modeling[16].

The research and development conducted in steps 1-4 became a base to develop detailed knowledge management process models, providing a conceptual overview of the entire KM domain. The models were created using the BPMN process documentation standard. Elements of the BPMN used in the diagrams are presented on Fig. 2. A sample detailed map for the process A. Identification (of knowledge or knowledge resources) is presented in Fig. 3.

The process of resource identification is concentrated on specifying a map of knowledge resources available in the organization. In order to best serve this purpose, it is very useful to start with creation of a conceptual framework of what knowledge the organization is dealing with.

[15] The author was one of the main experts developing the retail banking process model, as a part of a large Business Process Reengineering activity run by Accenture for a leading financial group in Europe.

[16] The author was not able to find any research that would address the topic of the desired level of detail in process modeling. The check against the retail banking model was the most easily available way of verifying the usability of the proposed KM process hierarchy.

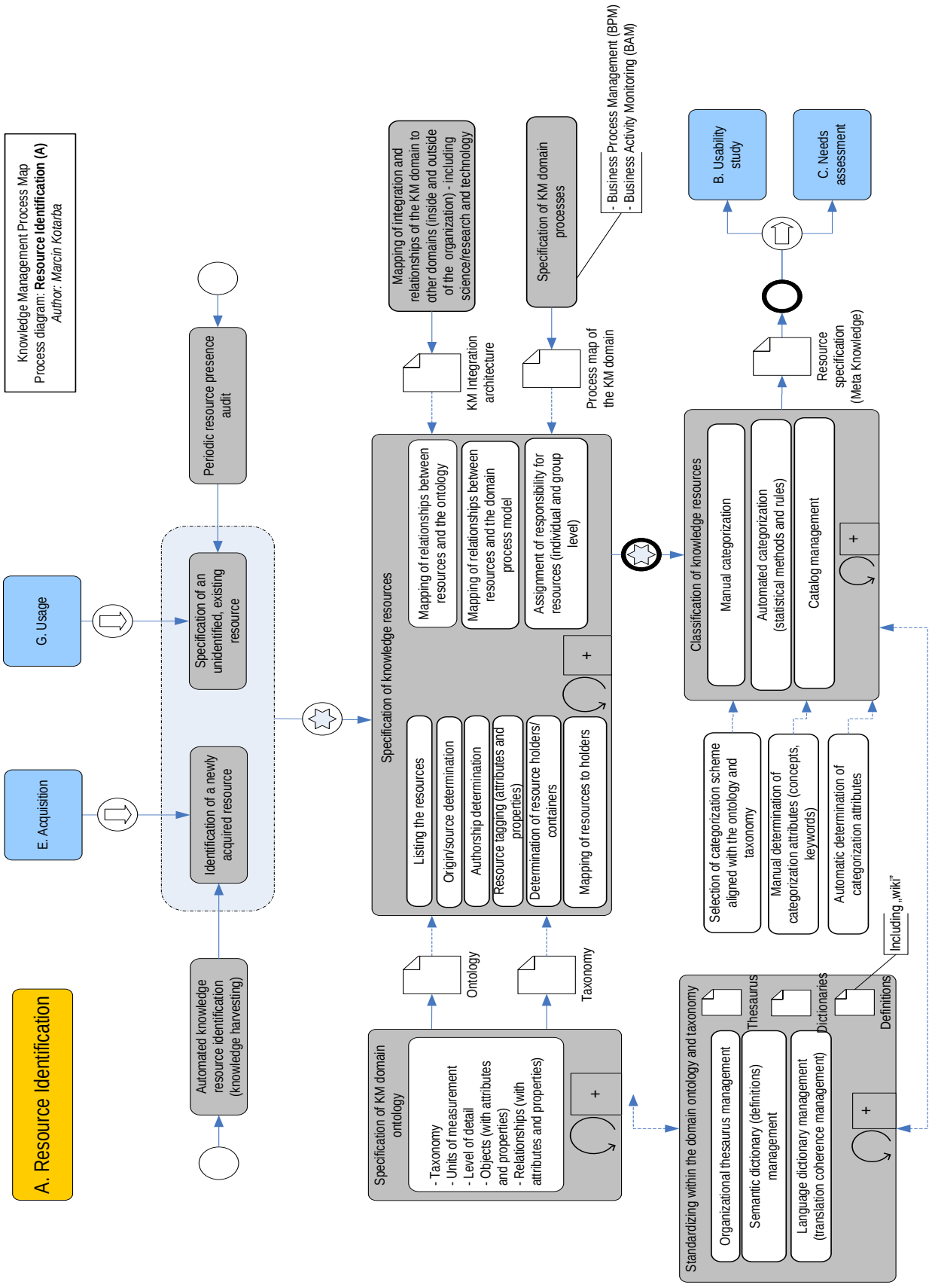

Figure 3. Detailed model of the resource identification (A) key knowledge management process *(source: self study)*

There are three key processes (A.1-A.3) that allow for building such a foundation:

A1 Development of the ontology for the knowledge management domain (linked to a selected business area), covering:

A.1.1 Formulation of the taxonomy

A.1.2 Evaluation of the desired level of detail for the ontology

A.1.3 Specification of objects in the KM domain (including the properties and attributes)

A.1.4 Specification of relationships between objects in the KM domain (including the properties and attributes)

A.1.5 Specification of measurement criteria for objects and relationships

A2 Specification of processes in the knowledge management area

A3 Specification of integration and relationships between the KM domain and other domains (internal or external), including academia and technology development.

The ontology, with its underlying terminology (taxonomy) defines a framework of objects and relationships that exist in various value chains of the KM domain, filtered to a specific level of detail and measures. We can compare it to a base map of a medieval castle with a high-level outline of functions performed by various architectural components and sections, such as the walls for protection, the turrets for counter-attacks, the castle square for day-time market activity, the water cistern, the blacksmith workshop, the winery or the arms storage. The legend on the map leads us through the morphology of the castle, also specifying the proper terms to be used in the description of the structure. The scale reflects the desired level of detail and the measurements allow to compare the size of various elements (e.g. the number of soldiers stationed in the towers). The next step in the understanding of the castle's life is to get a view on what processes are performed in its various quarters.

For example, we may conclude, based on general knowledge, that the blacksmith is responsible for the production of horseshoes and household/farming iron equipment. However, verifying the list of processes executed by our particular blacksmith we may conclude that his profession was also related to the production of weapons.

A comprehensive process study is important to obtain a broad view of organizational activities and is encouraged for every type of organizations. Last but not least we must understand the interactions of the castle with other domains. Internally it could be an interaction between the church and the secular elements of the castle's organization. Externally we can mention the relationships with other castle's, with surrounding villages or even with the capital city or the site of a regional ruler.

This picturesque example shows us the type of understanding of a given KM domain which is a necessary framework for successfully conducting KM activities. Without this insight into the details, it is difficult to properly conduct further KM activities.

The specification of knowledge resources is conducted with reference to the KM domain conceptual framework and covers three main processes (A8-A10):

A8 Specification of knowledge resources (location)

A.8.1 Listing resources, creating an organized and dynamic directory

A.8.2 Origin determination (indication of sources)

A.8.3 Authorship determination (legal purposes, authorization)

A.8.4 Resource tagging (attributes and properties)

A.8.5 Determination of resource holders (containers)

A.8.6 Mapping of resources to resource holders

A.8.7 Assignment of responsibility for resources (on the individual and group level)

A.8.8 Mapping of relationships between resources and the ontology

A.8.9 Mapping of relationships between resources and the processes

A9 Classification of knowledge resources

A.9.1 Selection of categorization scheme aligned with the ontology and taxonomy

A.9.2 Manual determination of categorization attributes (concepts, keywords)

A.9.3 Automated determination of categorization attributes

A.9.4 Manual categorization (operator driven)

A.9.5 Automated categorization (statistical methods, rules)

A.9.6 Catalog management

A10 Standardizing within the domain ontology and taxonomy

A.10.1 Organizational thesaurus management

A.10.2 Semantic dictionary (definitions) management

A.10.3 Language dictionary management (for standardized translations).

The resulting directory provides a broad view on the knowledge resources existing within the organization, together with their clear definition and a set of attributes that can be used for search and management purposes. The research performed by the author shows that the most important knowledge resources are people and organizational artifacts. Knowledge specification is subject to numerous challenges.

When interacting with human resources, we face the issue of tacit knowledge that is difficult to capture and structure. Artifacts on the other hand are explicit, but due to their volumes and complexity we still deal with the issues of unstructured and highly uncontrolled content. However, in both cases the process approach to knowledge specification supports a systematic coverage of the knowledge resources management.

The level of detail as well as the frequency and intensity of resource identification depend on the nature of the organization and its market surrounding. For highly dynamic and complex organizations it may be necessary to run resource identification as a continuous process, while for others it may be sufficient to conduct it as a periodic inventory. Regardless of the frequency, identification needs to be tightly linked to the incoming processes of knowledge acquisition (E) and knowledge usage (G) as they are the foundation for the registration and discovery of new knowledge resources. Four processes are proposed for these activities:

A4 Identification of a newly acquired resource

A5 Specification of an unidentified, existing resource

A6 Periodic resource presence audit

A7 Automated knowledge resource identification (knowledge harvesting).

With the conceptual framework and the knowledge resource directory, the resource identification process (A) can be interfaced with the usability study (B) and needs assessment (C). In the usability study, the resources are verified against the strategy, which results in taking a variety of decisions: keeping and developing the resources, keeping the resources without further investment ("hibernation"), disposing of the assets via sales or simply discontinuing the use of an asset. This process is very important from the cost point of view. By knowing "what" organizations possess and knowing how useful these possessions are, it is possible to better manage the budgets related to generation and maintenance of knowledge resources. A similar conclusion is applicable to the link with needs assessment (C). The better we know what we have, the lower the chance of "re-inventing the wheel" and repurchasing of resources. What is of equal importance is the ability to evaluate whether the resources held are meeting the desired quality criteria. Practical experiences show that it is common to assume that an organization has a required knowledge resource, while in reality this resource is either outdated or highly inaccessible. Increasing the usage and quality of knowledge resources is being pointed out as one of the top expected benefits of knowledge management[17]. It is therefore necessary to implement and continuously improve the processes of resource identification.

4 Working with the Knowledge Management Process Model

In chapters 1 and 2 the overall concept of the process based approach to knowledge management was presented, together with a more detailed pass through the selected main process of resource identification (A). Since the author claims there is a limited availability of practical implementation guidelines, methods and tools[18] in knowledge management, it is necessary to see how the process model can be used by organizations to support their KM goals.

The process model of KM is a proposal of an open reference model that can be used for both research, implementation and improvements of KM practices. The model offers a comprehensive and detailed specification of an inter-related KM process hierarchy. This hierarchy can be a base for analyzing the organizational "as-is" situation and for defining the desired "to-be" state.

[17] The author conducted a research of 26 description of KM benefits (322 instances of various benefits) and 21% of them were related to the increase of the level of use and the quality of knowledge resources.

[18] Some of the most widely discussed tools include: IPscore [11] and the Intangible Assets Monitor/IAM [17]. These tools however are mostly applicable to valuation and monitoring of intangible assets of organizations.

Following this logic, the author developed a method and a tool for auditing and planning KM improvement activities. The tool, code named KMBoost, was built as an MS Excel spreadsheet containing the full list of KM Processes (269 items), together with a scoring mechanism, for measuring current and target performance of the organizational knowledge management.

The scoring is located on each process level (1-3). It covers a declarative statement whether a given process exists in the organization and the perception of weight that the process has for the organization.

The score is calculated as follows:

$$\text{Score} = \sum_{p=1}^{269} \text{weight}_p * \text{presence}_p \quad (1)$$

Where for every process (p) from the list of 269 KM processes, the user declares a factor of presence = {0; 1} and its importance weight = {0; 0,25; 0,5; 0,75; 1}.

The tool is pre-populated with values of weights that were compiled by the author based on research and experience. The difference between the total as-is and the to-be score reflects the planned level of improving the knowledge management practices of the organization.

This feature is one of the key goals of KMBoost as a tool to allow for better understanding of knowledge management and increasing its performance.

The KMBoost tool contains a number of additional features, such as the evaluation of organizational artifacts (drivers of complexity), mapping between the processes and the IT solutions supporting KM, descriptions of IT functionality groups, descriptions of processes and graphical representation of scores (on the radar screen diagrams), presenting the as-is, to-be and benchmark scores.

All of the features of KMBoost are provided in the open, customizable format, which allows to be modified, exported or enhanced by importing lists and other features. Although the tool is linked to a proposed method of application (from as-is to the to-be in the continuous improvement cycles), there are no limitations with respect to other uses of the tool's content, especially addressing the questions:

- do we understand the scope/subject matter of knowledge management?
- do we manage knowledge in a conscious and organized manner?
- how advanced are we in managing knowledge?
- what KM practices should be implemented or discontinued?
- what should be improved in the present/active KM practices?
- how to plan KM improvements?

The underlying detailed KM process model (269 items) remains the core of the concept. Various studies can be conducted based on this model, while the model itself can also be subject to further development, both horizontally (new processes) or vertically (higher levels of detail). Users have the choice of following this expert weight scheme or introducing any changes specific to their organizations.

The factor of presence is recorded in the tool in two versions:

- describing the current ("as-is") situation,
- and the desired, target ("to-be") situation.

This approach is in-line with the business process reengineering principles where improvement of organizational activity is reached by a clear outline of the target process architecture and performance.

As a result, two total scores ("as-is" and "to-be") are calculated and expressed in the widely used RAG[19] standard. The red as-is status (coverage of processes below 60% of the total process directory) is interpreted as a necessity to immediately take action to improve the KM practices of the organization, since most likely several key processes are missing. The green as-is status is achieved above 80% of presence of the total process directory and can be viewed as reflecting high commitment of the organization to the KM agenda.

The amber status (between 60 and 80% of process presence) is interpreted as the area of threats (potential fall to the red zone) or opportunities (movement up to the green zone). In every RAG group additional scores are determined, with a total of 8 groups between the worst score (F) and the best score (A), following some typical academic scoring guidelines.

[19] RAG (Red, Amber, Green) is a system of "traffic lights" aimed at reflecting an overall status of a given initiative.

Table 3. Strengths and weaknesses of the process KM model and tools
(source: self study)

	KM Process Model	KM Process Tool – KMBoost
Strengths	- high level of detail in the process model (broad view of KM in organizations) - open nature of the model, allowing its further development or customization - usage of a practical (commonly used) process description language (BPMN)	- complete reflection of the process model (3 levels) and synchronization with the theoretical models - simple, but efficient scoring - usage of an open application environment, user friendly and customizable - link between KM processes and functionalities of IT systems supporting KM
Weaknesses	- high level of detail to be absorbed, especially if the time for workshops is limited. Requires a lot of effort to manage - lack of extensive description for each knowledge management process (reader must be well acquainted with KM before starting with the process model)	- the system of self-assigned weights too complicated, therefore a tendency exists to use the expert weights - lack of comparison with other organizations. Availability of benchmarks would greatly increase the value of the tool - it is difficult to work with the tool and methods without additional expert instruction. Potentially 1 additional session should be added prior to the workshops, just to clarify the model, methods and tools

5 Closing Remarks

The process model and the KMBoost tools were successfully verified by the author in several organizations varying in size and types of business (finance, banking, production, trade, scientific research laboratory). The research workshops with organizations included a questionnaire on the strong and weak points of the model and the KMBoost tools, as perceived by the users. The summary of key feedback can be found in Table 3. The positive evaluation of the proposed knowledge management process model, with the accompanying methods and tools provides strong encouragement to continue the study and development of this approach. Also, all weaknesses that were pointed out can be improved to deliver a higher quality model and tools (no blocking or critical weaknesses). Obviously the proposed process approach is not a panacea for all knowledge management issues. It is however a way to increase the understanding of knowledge management, its particular architecture and modus operandi in various organizations. The process approach defines a detailed view on "what" is knowledge management. The methods and tools associated with the usage of the process model allow to specify the "how" of knowledge management. This "how" is especially important for organizations that want to implement or improve knowledge management. Are there any organizations out there that would deny the necessity to do so?

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