

# THE ROLE OF MANAGERIAL NOTES IN KNOWLEDGE SHARING: HELPING THE MANAGEMENT OF UNSTRUCTURED INFORMATION BY USING TOPIC MAPS

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**Abstract:** In business a vast amount of information flows in various forms like e-mails, chat logs, telephone, fax, video, files, documents and web pages. In this paper we shall study how managers can organize these pieces of unstructured information making it semi structured in order to ease searching and sharing.

We will discuss a new technology called topic maps for information management. We shall suggest the use of managerial notes based on the ISO/IEC 13250 Topic Maps standard.

The timeliness of this subject is well illustrated by the war among the large software vendors like Microsoft, IBM, Novell, Google for the potential customers with demands for technologies handling unstructured information.

"Topic maps were originally designed to handle the construction of indexes, glossaries, thesauri, and tables of contents, but their applicability extends far beyond that domain. Research is showing that topic maps -- together with the Resource Description Framework (RDF) -- can provide a foundation for the Semantic Web. They can serve to represent information currently stored as database schemas (relational and object). Where databases only capture the relations between information objects, topic maps also allow these objects to be connected to the various places where they occur. Knowledge bases can be designed that not only relate concepts together but also can point to the resources relevant to each concept..."

"Topic maps are Global because they can be multilingual and multinational. The names of subjects in the topic map can be scoped by language, so that English speakers see an English map, and Spanish speakers a Spanish map. The Published Subject Indicator (PSI) mechanism allows communities of interest to come to agreement about their definitions of terms, and to post those definitions on the net in a known and stable format, so that a doctor in France can share a prescription with a doctor in the United States using common terminology." (Biezunski 2002)

**Keywords:** knowledge management, knowledge sharing, topic maps, XTM, unstructured information, classification, document management, capture, metadata

## 1. Introduction

"The problem, really, is twofold. The first is information overload. Faced with the endless deluge of data that is generated every second of every day, how can we hope to keep up? And in the struggle to keep up, how can we stay focused on the tasks that are most important and deliver the greatest value?"

The other problem is something I call information underload. We're flooded with information, but that doesn't mean we have tools that let us use the information effectively.

Companies pay a high price for information overload and underload. Estimates are that information workers spend as much as 30 percent of their time searching for information, at a cost of \$18,000 each year per employee in lost productivity. Meanwhile, the University of California, Berkeley predicts that the volume of digital data we store will nearly double in the next two years."

Bill Gates wrote these words in a letter dated May 17, 2006 addressed to the users of Microsoft. (Gates 2006)

In this study we would like to introduce a management system for managerial notes (eNotes) based on the Topic Maps standard to be used by managers of small enterprises. We believe, that the management of unstructured information existing in the enterprise could be enhanced successfully by the recommended eNotes system.

A mighty struggle has started among multinational software development companies, such as Microsoft, IBM, Novell, Google and others for winning potential buyers. One of the major initiators of this struggle is the rapidly growing need for new technologies that could handle these unstructured pieces of information.

Bill Gates has stated the following about this issue: „Those products such as Windows Vista, a Microsoft Office SharePoint Server 2007 and Microsoft Office Outlook 2007 in the 2007 Office system will bridge the gap that separates the information workers from the pieces of information that are necessary for making their work more efficient.” (Gates 2006)

Google promises free storage space and software for those, who make use of its program product called Google Docs and Spreadsheets.

All software developing companies envisage the electronic management of notes on a web based platform, which would also integrate document management, CRM (Customer Relationship Management), ERP (Enterprise Resource Planning), SCM (Supply Chain Management), HRM (Human Resource Management) and DB (Data Base) functions as well.

In chapter 3 of our study we would like to attract some of the attention to the developers of Topic Maps in addition to the giants of software development.

## **2. Background and motivation**

Our research is the continuation of the research of document management systems which we started at the end of the 1990s. In the beginning our interests centered around the document metadata as well as classification schemes. (Fulop, Hernadi, Kovacs 2001)

Since 2004 the investigation of knowledge sharing has been in the forefront of our research. However we still consider the role of classification schemes and the creation of a management ontology to be important. (Fulop, Hernadi, Kormos, Kovacs 2005)

The publication of the Dublin Core Metadata Initiative (DCMI 2007) and that of the MoReq de facto standard has meant a great advance in document management, which is the basis of our work. The MoReq standard is already the result of the fact that the European Council has realized the importance of document management (DLM Forum 2007).

We conceived the idea in 2006 that in addition to the management of documents we should be engaged in the management of managerial notes (Kovacs and Lencse 2007). This idea is of course not new. The systematic management of notes with the name Time Manager spread quickly from the end of the 1970s. Both the Time Manager method (the use of a binder with replaceable forms) and the philosophy has become very popular among managers, whose most important expectation towards managers was that at the end of each day the detailed plan has to be written down for the following day.

The notes and documents are called unstructured pieces of information. The standardization of notes plays an important role in the management of unstructured information. The reason for this is the huge amount of notes.

This is particularly true if we include the capture notes of the documents, the metadata and the occurrence of the document in the sets of managerial notes. The phone number of an important customer is just as important for a manager as the information where he can find the business contract signed with this customer.

The usability of notes standardization has been examined by means of the employment of a table in a MS WORD document. We put in our notes with the metadata into a table called eNotes. The metadata about the documents were entered into the table, whereas the document was stored separately in the repository. A hyperlink pointed to the document in the eNotes table. The document classification

scheme is described in another table. This is equivalent to the folder structure, the list of partners and a list of document type names.

In the course of everyday use an increasing number of hyperlinks were entered into our eNotes table, which was not pointing to our own repository but to the Web, since more and more valuable pieces of information have been downloaded from the Internet. Like others in response to a number of futile searches, we have been getting closer and closer to the semantic web. We cannot recall exactly when the idea came up that the possibilities offered by the topic maps standard should be tried. After having read a few articles we felt like we have found the real solution for the management of our notes. We hope that we are not going to face the same situation as in the case of the decision making tables method that was so popular in the early 1980s and nobody can remember today.

### **3. The problems of handling unstructured information**

The management of unstructured information has come to the fore in recent years. Such pieces of information are perhaps even more important in companies than structured information. Only 20% of information can be found in data tables and in the databases composed of data tables and data management, whereas 80% of the information is unstructured.

The following opinion also shows the emerging importance of pieces of unstructured information:

"Knowledge management transforms structured and unstructured information, selects and combines the important information for a user in a specific context, so that decisions and the actions of companies are supported..... To be able to realize knowledge management in a company, a multitude of individual IT solutions must be taken into consideration and viewed within a holistic approach, e.g. archiving and DMS systems, retrieval and agent technologies, workflow, portal and content management systems." (Ovitas 2007)

There are two extreme views present among the researchers with regard to the management of unstructured information.

#### **The first view is associated with the name of Herbert Simon:**

An often-quoted saying of Simon is:

„In a knowledge-rich world, progress does not lie in the direction of reading and writing information faster or storing more of it. Progress lies in the direction of extracting and exploiting the patterns of the world so that far less information needs to be read, written, or stored. Progress depends on our ability to devise better and more powerful thinking programs for man and machine." (Simon 1971)

#### **The second view originates from those researching artificial intelligence:**

Those, who – in contrast to Herbert Simon, the father of artificial intelligence – do not believe in the importance of structural makeup, and emphasize the importance of keywords and metadata.

Both views emphasize that the management of unstructured data is an unsolved problem. As in many other cases, it is probable that the right solution is provided by the silver lining, i.e., the themes arranged in hierarchical structures are of the same importance in the categorization of unstructured information as the display of metadata as keywords.

In contrast to the familiarity about the growing trend of masses of information on the Internet, very little attention is paid to the huge expenses incurred to find what we need in the unstructured data mass. In business life a huge amount of unstructured information is flowing in: e-mails, chats, phone conversations, fax messages, videos, written communications, documents, web pages and we could carry on naming the various presentation forms. If we attach metadata to unstructured information, e.g. we register the document, then we get a semi-structured piece of information. In the case of information found in data tables and database operators, structured information is the point at issue.

The first step in the management of unstructured pieces of information is the recognition of the problem. Only after this can we start turning the existing pieces of information into semi-structured information. (Blumberg and Atre 2003)

For search refinement purposes the classification of information containing objects is necessary. According to our experience most people in an organization are unable to identify themselves with the classification system that exists within the company. The managers are not always motivated in systematization either, since by way of systematization others can also look into the unstructured pieces of information, some of which can be classified.

#### 4. Topic Maps (TM) paradigm

The topic maps view, which can be called TM paradigm, was described in the TM standard. (ISO/IEC 13250 2000)

The HyTime standard was used in the TM standard, which was founded on the SGML. Similarly the TMQL, the TMCL and the XML standards were also used.

This also demonstrates well the complexity of the topic maps standard. At the same time the standard contains very few examples, therefore it can be interpreted with difficulty.

In the following part we are going to cite a few of the opinions relating to the paradigm of trendsetter persons and organizations dealing with the topic maps:

According to the opinion of Ontopia AS: „Topic mapping is a new paradigm for organizing, retrieving, and navigating information resources.” (Ontopia 2007)

Steve Pepper is the Founder and Chief Strategy Officer of Ontopia, a company dedicated to the development of high quality topic map software and the provision of consulting and training services.

As Michel Biezunski of Infoloom describes „The Topic Maps paradigm provides a powerful way to make it possible for people to use computers to help them sort through otherwise unmanageably large sets of possible traversals by allowing search criteria to be focused using a sophisticated array of topic-combinatorial principles.” (Biezunski 2000)

"In the navigation paradigm of Topic Maps, users navigate through a conceptual space, which is a very different approach than now used in search engines like Google," said Ilya Zaslavsky, research scientist in SDSC's DICE group which partnered with Mondeca, a French developer of advanced XML Topic Map technology. (Zaslavsky 2001)

#### **The authors consider the essence of the Topic Maps paradigm as follows:**

A new world in the description of classification schemes and their display. Whereas among the elements of hierarchical scheme (graph) only one association can exist, e.g. is integrated or constitutes part of it, in the TM other association can also be nominated, e.g. it is its base.

One firm specializes in secretarial duties, another one is a pro in HRM, and the third one is a pro in financial affairs. They are preparing the TMs separately, and then they merge them.

There is no other category any more, which is often a garbage can, since if we need to insert a new category, then we simply add it as a new topic. Meticulousness in the structures continues to be useful, but the system is not turned over (the programmer is not driven crazy) by adding a new element into the hierarchy.

The greatness of topic maps lies in their simplicity. The simplicity lies in the fact that associations are built by pairs. An association is inserted always only between two topics. In everyday practice hierarchies of several elements occur in large numbers. For example: organizational figures, procedure structure, in the case of research projects the hierarchical structures of scientific disciplines. A structure of 20-30 elements is not infrequent, whose management is easier in TM. At the same time it must be admitted that a structure of four levels, on the lower three levels with five-five elements, can be described with 155 topics and 155 associations (element pairs), which is not negligible.

The TM has shed light on the fact that the classification schemes of documents do not have to be equivalent to the repository folder structure.

During the capture of the documents a key question is the management of the metadata attached the documents. This can be solved in a simple manner in topic maps. The metadata become associations, and the metadata values become topics. Having knowledge about the gluttony for metadata of public administration – for example in the public administration of Hungary 62 metadata are expected to be attached to a record – it is not certain that the use of topic maps will spread quickly in this public administration. In Chapter 5 we will address the use of metadata in more detail, and also the fact/idea that by means of the use of „resourceData” the metadata can also be managed differently.

The topic map document is an XML document, thus its convertibility and usability is extensive, in contrast to the databases of individual systems.

Adhering to the RDF standard and the Topic Maps standard ensures that a RDF document should be transferred to a TM document and vice versa. Both of them are a display form of the semantic web.

Both standards aim at the organizing of those concepts that we are talking about or which have been conceived in our brain and become reified in some form. They have become reified in notes or in a document: in pictures, in films, in sound recordings, in drawings, in writings etc. in summary in an addressable subject.

## 5. The management of managerial notes in Topic Maps.

Our goal is to provide for the manager (Alexander) of a small enterprise (Alfa Ltd.) such a tool (Topic Map) by which he can manage the unstructured pieces of information of his firm. It has to do with the management of information objects that exist in reified form, which are called resources. We can talk about two big groups of information objects. One group is the so-called notes, which can be stored in short string form within the topic map; these are the so-called internal resources. The other group of information objects consists of documents, which are stored independently from the topic map documents, either in the repository of the enterprise or somewhere else on the Web. Therefore the documents are called external resources.

The topic map to be created manages the notes of the manager of the enterprise related to his enterprise. The notes of the metadata of the documents are also sorted among in the notes, which are marked by a capture term within the document management domain. Thus the Hierarchy (subtype of) appears in the following manner:

Notes

    Managerial Notes

        eNotes\_alfa, which will also be the name of the topic map (topic id="enotes\_alfa)

The eNotes\_alfa is a Topic Map based on an XTM document – XML – which can be accessed in the repository of the Alfa Ltd. (Subject Identifiers): [http://alfa/genman/knowman/secretariat/enotes\\_alfa.xml](http://alfa/genman/knowman/secretariat/enotes_alfa.xml)

The topics in the eNotes\_alfa topic map are the notes of Alexander. The number of these is increasing day by day, according to our estimate by 10 entries per day and 10 other notes per day. In order to be able to manage the numerous notes, the notes must be classified; topic types must be created.

The topic types, which are also topics themselves, can be organized in a hierarchical structure. We are making a proposal for this in the below figures: Figures 1-6.

### 5.1. Typification

James Currall, Klaire Johnson, Peter McKinney in their lecture entitled VALUE MODEL that was presented at the DLM Forum in Budapest in 2005 emphasized the following four factors for the investigation of the value of the pieces of information (Currall, Johnson, McKinney 2005):

Service provision for the partners – costumers and external interested parties.

Service provision for the internal business, management processes.

Service provision for innovation and development.

Service provision for satisfying the information need about financial and balance of accounts.

Rudolf Ungváry considers these the most general conceptual categories in his article entitled: „The grouping of lexical units according to categories” (Ungvary 2006):

**A** matter (words without outline, those meaning amorphous concrete or an abstract thing)

**O** object (matter having an outline, an abstract object of unit type nature)

**M** movement (all processes, activities, deeds, events, happenings, cases)

**T** attribute (concepts representing attributes)

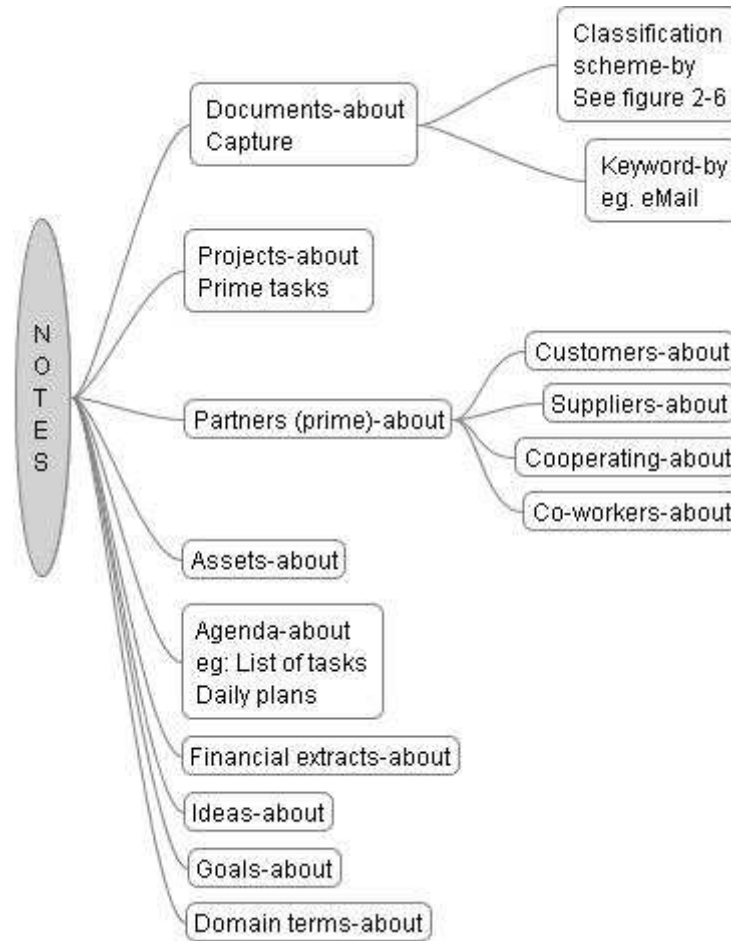
**Á** state

IBM means by business content the following items (Kovacs, L. 2006): accounts, balances and reports. Scanned documents and fax. ERP (Enterprise Resource Planning), SCM (Supply Chain Management) and CRM (Customer Relationship Management) data. E-mail. Office stocks. Photos, images and sounds. Web content.

The general guidelines enumerated in point 5.1 will be taken into consideration in point 5.2 which follows.

### 5.2. Proposal for eNotes\_alfa topic types

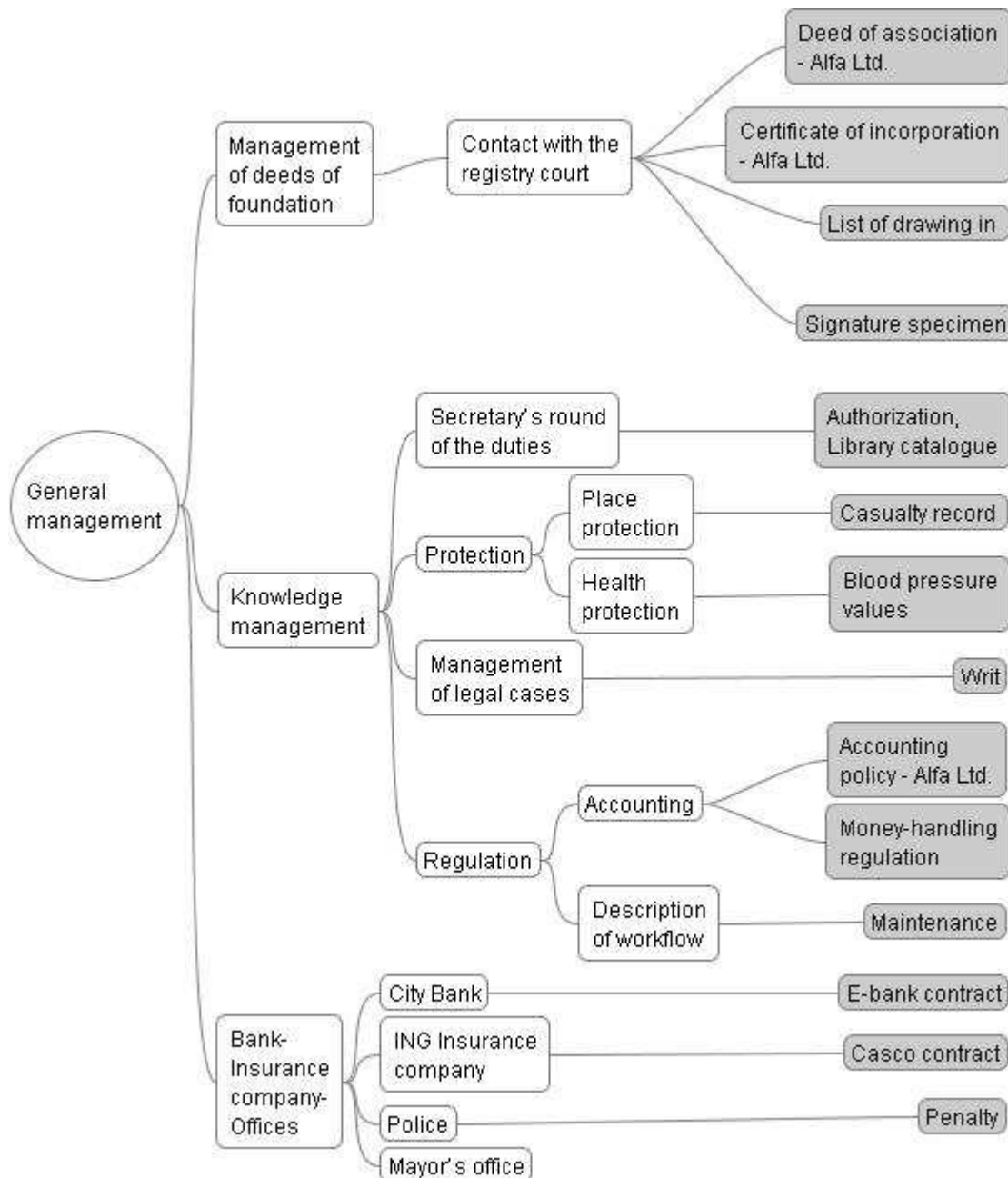
In Figure 1 the types of managerial notes are described.



**Figure 1:** The description of types of managerial notes

Both the above typification and the typification described in Figures 2-6 below are arbitrary, although they contain several years of experience of the authors. We have not been able to overcome the habit of selecting not more than 5-7 classes of equal value during the process of classification. It is another tradition that classification according to functions should also be the basis of the storage of documents.

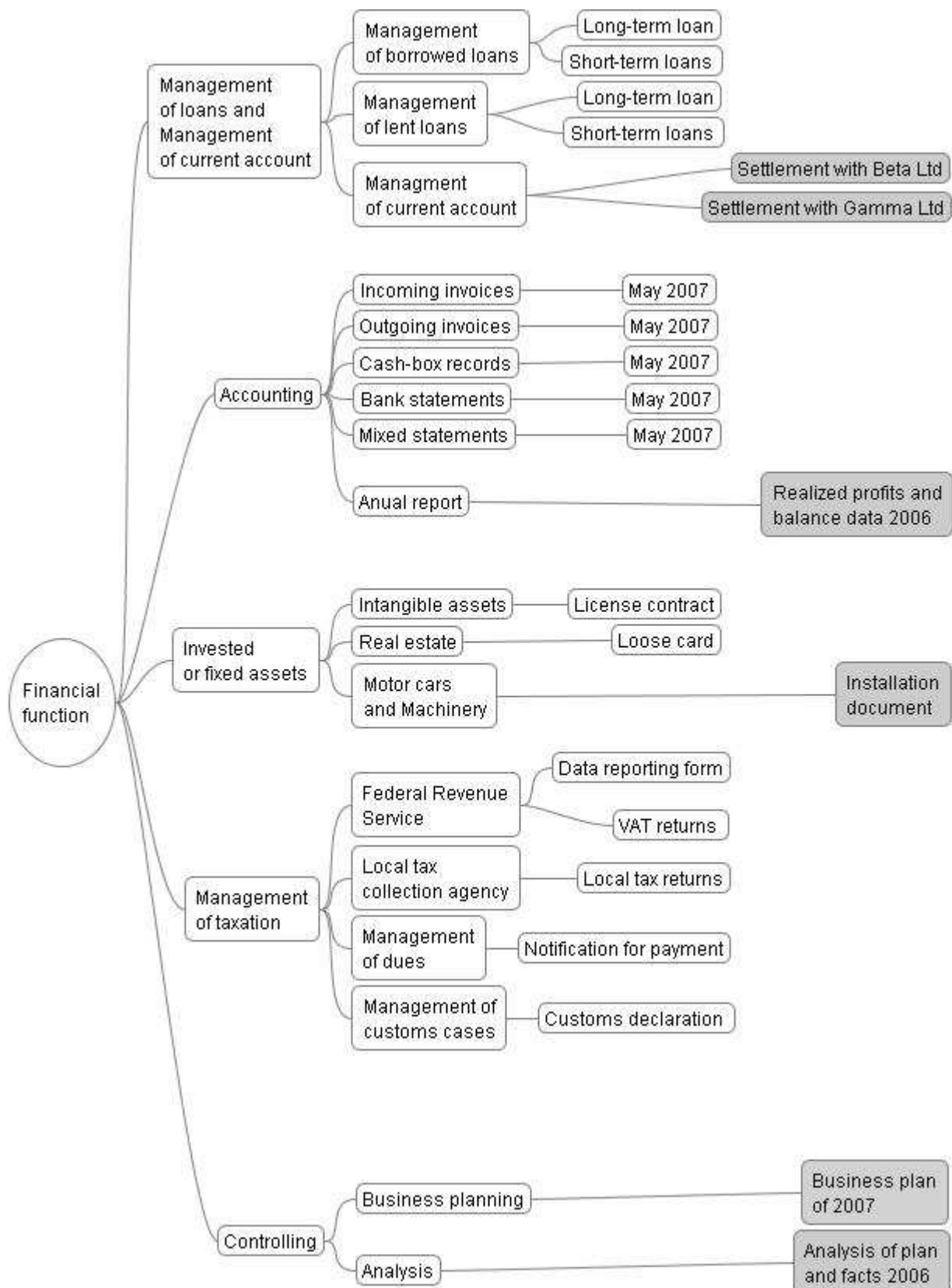
The activity called by Porter the infrastructure of companies is described in Figures 2-3 (Porter 1998).



**Figure 2:** The breakdown of general management function into sub-functions.

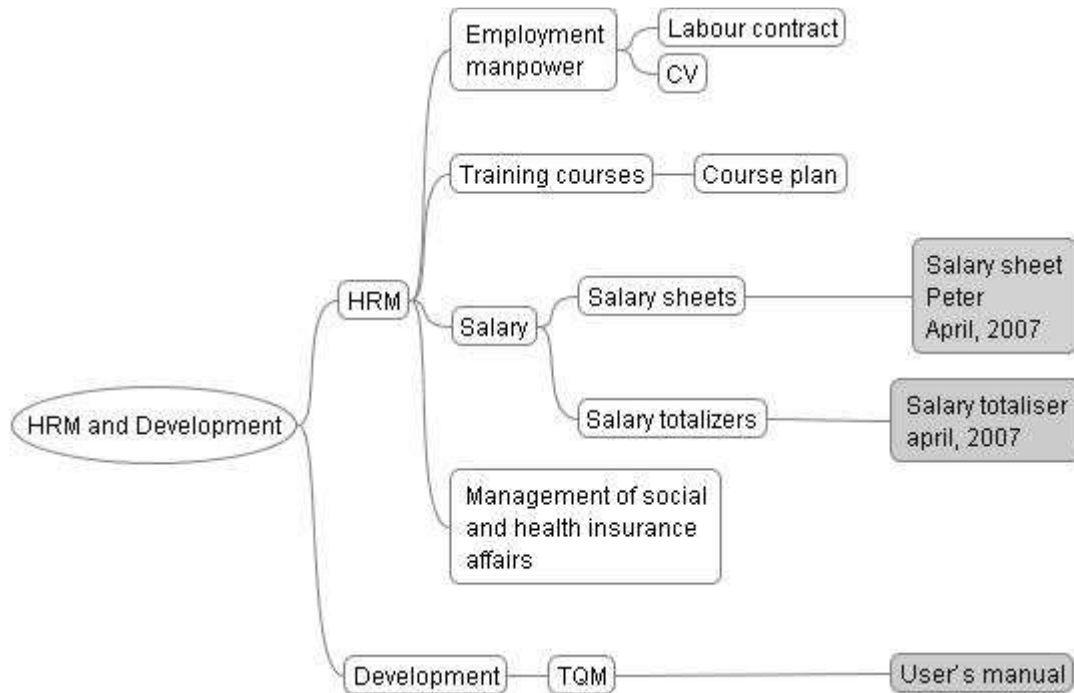
The real world is very complex. The partial functions are only sketched in the Figures. The elements highlighted greys on the right side of the Figure are document topics.

The most complex description is displayed in Figure 3, with the name Financial function. The controlling function appears in a very simplified form. The very benefit of topic maps lies in the fact that new controlling topic types can be inserted subsequently.



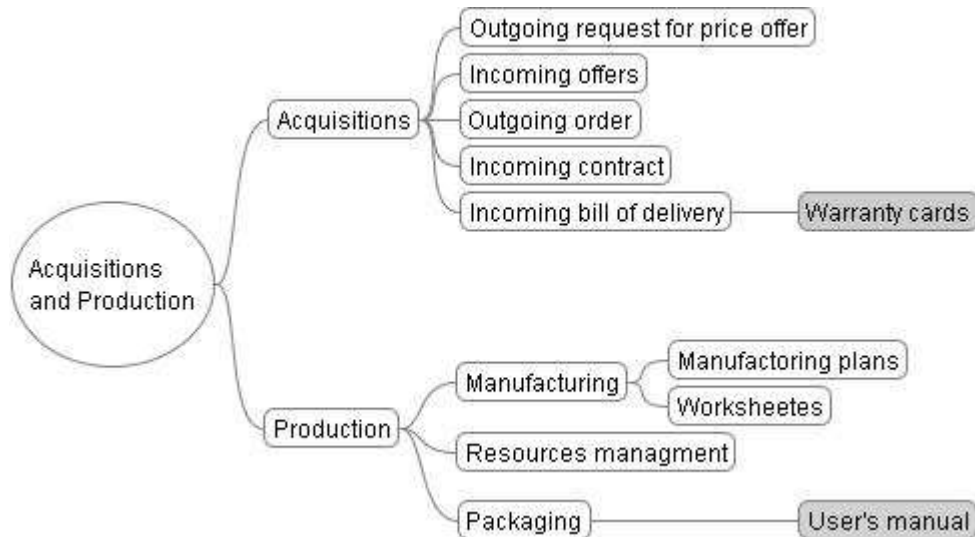
**Figure 3:** The breakdown of financial function into sub-functions.

Figure 4 contains two main functions: Human Resources Management and Development.



**Figure 4:** The breakdown of HRM and Development functions into sub-functions.

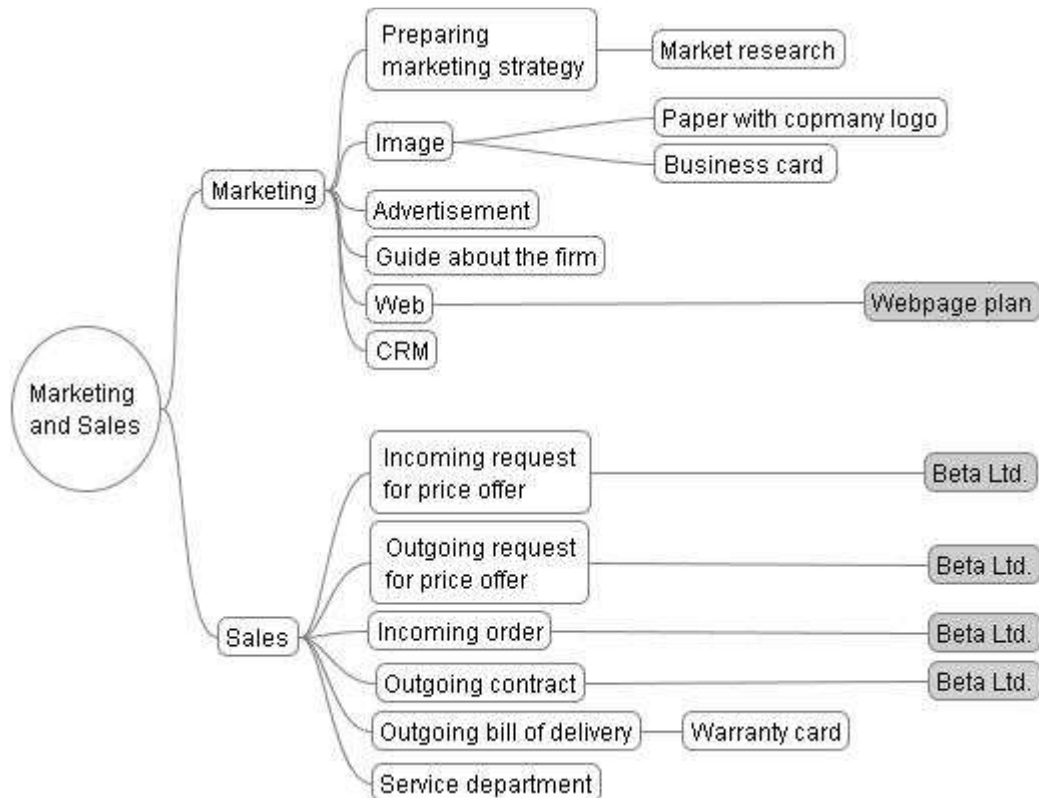
Figure 5 also contains two main functions: Acquisitions and Production/Services.



**Figure 5:** The breakdown of Acquisitions and Production/Services functions into sub-functions.

Comment: the processing of incoming invoices (owing to practical considerations) is assigned to Accounting function.

Figure 6 also contains two main functions: Marketing and Sales.



**Figure 6:** The breakdown of Marketing and Sales functions into sub-functions.

Comment: the processing of outgoing invoices (owing to practical considerations) is assigned to Accounting function.

### 5.3. Case study

The management of the electronic notes and electronic documents of a small enterprise manager by means of the use of Topic Map (XTM) based on XML – the name of the managerial notes: Alfa\_eNotes. Based on the webpage: „XML Topic Maps (XTM) 1.0” (Pepper and Moore 2001)

Alexander is the owner manager of the Alfa small enterprise. Peter is the new employee of Alfa small enterprise.

#### **Subjects appearing during the conversation of Alexander and Peter as well as those appearing in the brain of Alexander:**

Subject1: HRM (Human Resource Management)

Subject2: hiring of employee

Subject3: a friend of Alexander has told him that Peter is diligent and therefore in the brain of Alexander the image was formed that it is worth hiring Peter

Subject4: Peter has made a good impression on Alexander and in Alexander’s brain a pleasant sensation is associated with Peter

Subject5: the preparation of a work contract

Subject6: Peter

Subject7: Peter’s work contract

#### **In the real world the following are present:**

Peter, as an employee

Peter’s work contract, as a paper-based authentic document

#### **In to the topic map, as topic, the following are entered:**

Topic1: HRM

Topic2: hiring of employee

Topic3: the preparation of a work contract

Topic4: Peter

Topic5: Peter's work contract

Comment: Subject3 and Subject4 are not entered into the topic map, since reified information is not attached to them, so-called resource, the sensations existing in Subject3 and Subject4 cannot be reified yet at the present time. The topics are in hierarchical relationship with each other, and Topic5: Peter's work contract differs from the other topics to the extent that a resource is attached to it. The resource: (a doc file (set) about Peter's work contract) in the repository of Alfa small enterprise.

#### **The associations that are entered into the topic map:**

Association1: sub-function of –(e.g. Topic2, sub-function of –, Topic1)

Association2: for (e.g. Topic3, for, Topic4)

#### **The occurrences that are entered into the topic map:**

Occurrence1: file://alfa/hr/felvetel/labourcontract/peter/peter\_lc\_070517.doc

Comment: the folder names featured in the path do not have to be identical with the topic names, it is also conceivable that the classification scheme of documents according to functions is not equivalent to the repository folder structure.

#### **The information objects that land in the sea of resources, which are not parts of the topic map:**

It is expected that the resource referred to must exist.

Let us examine the insertion of metadata attached to the work contract of Peter into the topic map (TM).

This document is a set to which a doc file is attached as a resource, to which an occurrence points. The base name of the document as a topic will be the file reference. By this also an important metadata will be inserted into the TM.

1-title: the topic base name of Peter's work contract, in our case a file reference: e.g. 10045,

2-creator: this would be used if we were working in the topic map of a group of firms and we would wish to indicate which firm is the owner of the document,

3-subject: it is more correct to call it keyword, because the topic maps standard interprets the word subject differently. In our case a keyword can be: „on a trial period“. In order to have the topic on a trial period as a keyword attached to Peter's work contract, we do not have to do anything else than to insert it as an association into the topic map: 10045 – keyword – on a trial period, where 10045 is the base name of the document, the keyword is the association and a trial period is another topic.

4-type: the internal name of the document, e.g. outgoing invoice, incoming business contract, work contract, curriculum vita. We do not consider appropriate the use of the term type; we use the term document internal name instead of an association type name.

The size of this article does not allow it to further analyze in detail the metadata proposal by Dublin Core.

## **6. Conclusion**

In our paper we have examined how managers could organize the unstructured pieces of information used by them, how they could make them semi-structured and thereby making them easier to retrieve and share.

Topic Maps constitute a new technology as a foundation for the Semantic Web. We believe that this new technology could facilitate knowledge sharing substantially. We have written this article in addition to the typifying of managerial functions for the sake of drawing the attention of the public to the technology of Topic Maps.

According to Dan Remenyi: “one of KM's main problems is it's lack of clarity. Definitely, from the economic point of view, Europeans are a)overpaid and b)underworked. We have to work smarter both as industries, as organizations and as countries.” (Remenyi 2004). This remark of professor Remenyi again highlights that clarity is essential in knowledge management. Besides, the lack of diligence also fits our topic perfectly as creating and using a Topic Map is no easy task but it is one that certainly carries its own rewards.

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