ROLE OF KNOWLEDGE MANAGEMENT IN CORPORATE INTELLIGENCE – A SURVEY

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Abstract- The capabilities and complexity of IT systems are growing day by day. The pressure on IT Managers is increasing, as they are the sole responsibility to make decisions. Knowledge management and corporate intelligence can be integrated to make efficient decisions in corporate sector. "Knowledge management" comprises a set of strategies used in an organization to identify, create, represent, distribute, and enable adoption of insights and experience. "Corporate Intelligence", is the most sought after word which enables the IT industries to arrive at a better decision. Corporate intelligence is mainly used to make decisions in the industries. Knowledge codification deals with representing and organizing knowledge. In this paper we have analyzed and compared the different techniques that are used for knowledge management in corporate intelligence and reported the areas in which these techniques can be used. It also points out the scope and challenges in designing KM systems.

Keywords- Knowledge Management, Knowledge Codification, Case-Based Reasoning.

I. INTRODUCTION

With the advent of the 21st century moving on into a Knowledge Economy, knowledge management and Corporate Intelligence have become two important weapons to enhance the level of competition in the corporate. "Knowledge management" can be used to accomplish knowledge transformation, sharing within business. "Corporate intelligence" can be defined as the technology, which is used to extract valuable information from a set of data. Both these techniques must be integrated which will enable easy Decision Making in the corporate field.

The entire knowledge management cycle can be depicted in 3 steps-knowledge creation, knowledge transfer, and knowledge use as shown in Fig 1

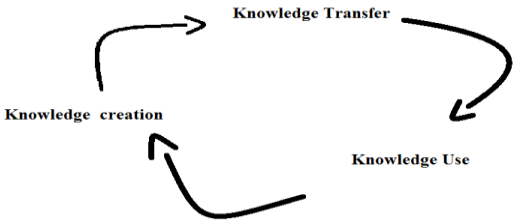

Fig 1 KM life cycle

Created knowledge is transferred in two ways Personalization (direct) and Codification (indirect). Knowledge codification means converting tacit knowledge to explicit knowledge in a usable form for the organizational members. Organizing the available information and representing them as knowledge is called as Knowledge Codification. CBR is the widely used tool for codification. Case Based Reasoning is an Artificial Intelligence. In simple words, CBR compares the current problem with the existing problem in the knowledge base and matches the case. If a match is found, it provides solution of that problem to solve the current problem. Knowledge base consists of set of cases and their related decisions. So when a new problem arrives matching of cases can be done to solve it.CBR works based on the previous cases. Fig 2 illustrates the CBR process in detail.

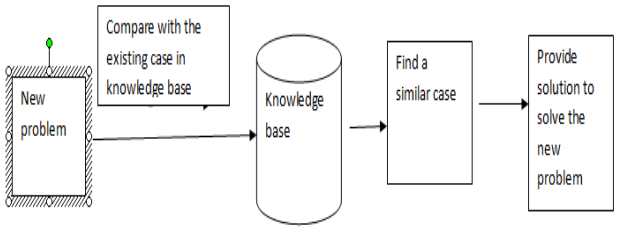

Fig 2 CBR Process

II. LITERATURE SURVEY

Most literature on KM classifies knowledge into two main categories: explicit knowledge and tacit knowledge. Explicit knowledge can be defined as things that are clearly stated or defined, while tacit knowledge can be defined as things that are not expressed openly, but implied. [1] describes that both types of knowledge can be represented as models, which in turn will facilitate the management of such knowledge. Explicit knowledge can be managed more easily because it exists in a tangible form such as: books, manuals, handbooks and so on, which facilitate communications although tacit knowledge can also be managed if it can be converted into explicit knowledge.

Knowledge conversion can be achieved through the processes of: socialization, externalization, combination and internalization.

[2] describes the decision-making tools, which is used in knowledge management for corporate intelligence.

Case base reasoning [3] is a form of reasoning by analogy in Artificial Intelligence. It compares the present scenario with the past scenario and searches for the best cause and effect relationship. The basic principle of CBR is that it provides a solution to the current problem(target case) by comparing it with the past situations(base case).In short, it maintains a pool of problem solution pairs from which it provides a solution to the current problem.

From [4], with the advent of many new technologies, corporate industries face the similar problem of security. As the data increases, the question of security also increases. Many industries face the same problem as the there are numerous threats imposed on them. They arrive at a solution by applying the same knowledge but each industry does it on their own, which is very ineffective. In this paper, they have proposed a community knowledge-base prototype, which was designed to benefit many organizations.

[5] Explores the various techniques of data mining which was used in knowledge management process. The paper focuses on the basics of knowledge management, how to create knowledge base and its related tools, role of Knowledge management in Corporate Intelligence.

[6] focuses on the development of Knowledge Management tools in information technology. This paper also classifies the KM tools into different groups, which include the areas employed and functionalities provided. The tools for KM are focused on assimilation, comprehension, and learning of the information by individuals who will, then, transform data and information into knowledge.

This paper [7] provides a framework for characterizing the various tools and techniques available to knowledge management practitioners. It provides an overview of a number of key terms and concepts, describes the framework, and explores a variety of potential application areas.

This paper [8] focuses on the generic Ontology-based User Modeling framework, its components, and its associated user modeling processes. This framework models the behavior of the users and classifies its users according to their behavior. This paper discusses some of the implications of ontology-based user modeling for semantically enhanced KM and, in particular, for personal KM.

The purpose of [9] is to distinguish and describe knowledge management (KM) technologies according to their support for strategy. The study employed an ontology development method to describe the relationship between technology, KM and strategy, and to categorize available KM technologies according to those relations. Ontologies are formal specifications of concepts in a domain and their inter-relationships, and can be used to facilitate common understanding and knowledge sharing.

This paper [10] describes a problem-centered collaborative knowledge management architecture associated with Computational Problem Solving (CPS). The problem space, which corresponds to well-defined computational problems, is the heart of the CPS research domain.

III ANALYSIS OF KM TECHNIQUES

The three major steps in knowledge management are knowledge creation, transfer, use. Several tools are used for this purpose. Knowledge creation/capture can be done using Authoring tools, templates, data mining, and annotations for content creation. Metadata tagging, classification, archiving for content management, Telephone, fax, mail and internet can be the tools used for knowledge sharing. According to Liao [5], KM technologies can be classified into seven categories as shown in Fig 3.

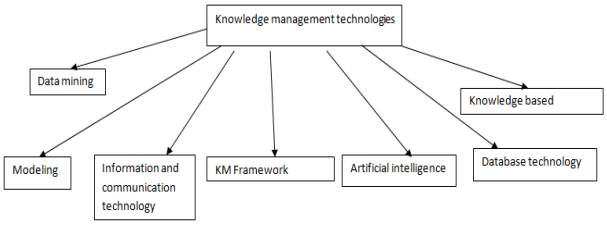

Fig 3 KM technologies

Knowledge Modeling:

Models are used to capture the essential features of real systems by breaking them down into more manageable parts that are easy to understand and to

manipulate. Models are very much associated with the domain they represent.

Steps involved in the modeling process:

- The modeling process constructs conceptual models of knowledge- intensive activities.
- During the knowledge acquisition stage, most of the knowledge is unstructured and often in tacit form.
- The knowledge engineer will try to understand both the tacit and the explicit part of the knowledge and then use simple visual diagrams to stimulate discussion amongst users and knowledge experts.
- This discussion process generates ideas and insights as to how the knowledge is used, how decisions are made, factors that motivate and so on.
- The knowledge engineer then has to construct the conceptual model from what has been discussed during the knowledge acquisition stage.This communicates the knowledge to the information specialist who will transform the model into workable computer programs or codes.

With the modeling approach, systems development can be faster and more efficient through the re-use of existing models for different areas of the same domain. Therefore, understanding and selecting the modeling technique that is appropriate for different domains of knowledge will ensure the success of the knowledge management system being designed.

The most common techniques described in [1] to model knowledge are shown in Fig 4. They are divides into

- CommonKADS
- Protégé 2000,
- Multi-perspective modeling.

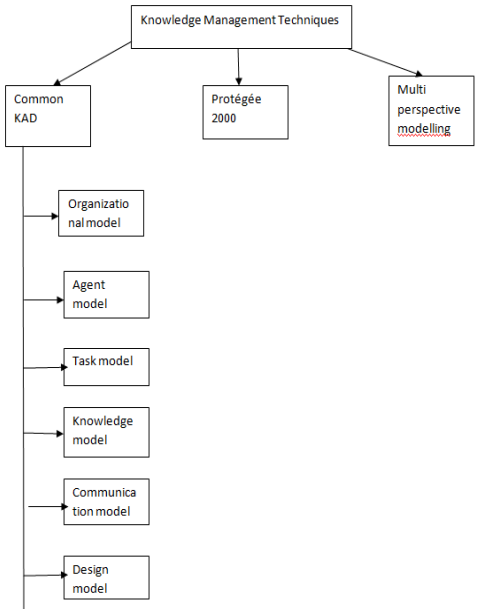

Fig 4 KM techniques

Common KADS:

Common KADS is used extensively in European research projects. It supports structured knowledge engineering techniques by providing tools and suite of models for corporate knowledge management. It also includes methods that perform a detailed analysis of knowledge intensive tasks and processes. The modeling suite supports the modeling of the organization, the tasks that are to be performed, and the agents that are responsible for carrying out the tasks.

The models used are:

Organizational Model

The organization model is regarded as a feasibility study for the knowledge system. The study is conducted based on problems and opportunities. The organization model serves three main purposes:

a] Identifying the area in an organization where knowledge-based applications can be implemented,

b] Identifying its impact in the organization when it is implemented, and

c] It provides the system developers with a "feeling" for where in the organization the applications will be deployed.

Agent Model

Agent model helps to understand the roles played by different agents when performing a task. Agents can be people, computers or any other entity that can perform a task.

Task model

The purpose of the task model is to provide an insight in to the likely impact that introducing the knowledge system will have on the organization.

Knowledge Model

The knowledge model is used to describe the application related knowledge used to perform tasks and the role of the knowledge in problem-solving activities.

Three categories:

a] Task knowledge that describes the order of execution for the reasoning steps

b] Inference knowledge that describes the reasoning step performed using the domain knowledge and

c] Domain knowledge includes properties, concepts, and relations, and so on in the application domain.

Communication model

The communication model describes the inter-agent communication needed when performing the tasks.

Design model:

The design model is a technical specification of the system in terms of its architecture, platform, modules, constructs and computational mechanisms.

Protégé 2000:

- The Protégé 2000knowledge modeling environment is a frame-based ontology-editing tool with knowledge acquisition tools that are widely used for domain modeling.
- The frames are the main building blocks for a knowledge base.
- A knowledge base in Protégé is developed in the following sequence:
  - First, concepts and their relationships are defined by ontology.
  - Second, the domain experts enter their knowledge of the domain area using the domain-specific knowledge acquisition tool.
  - Finally, problem-solving techniques are used to answer questions and problems of the domain using the knowledge base.

Multi-perspective Modeling:

- Multi-perspective modeling enables a number of techniques to be used together, each technique being the most appropriate for modeling that particular aspect of knowledge.
- The appropriate modeling technique for multi-perspective can be selected from business management techniques, software engineering techniques and knowledge engineering techniques.
- However, to provide a multi-perspective representation of knowledge, there are three main umbrella methods, namely: CommonKADS, UML, and IDEF.

Knowledge codification which is done using CBR is explained in [3] as in Fig 5.

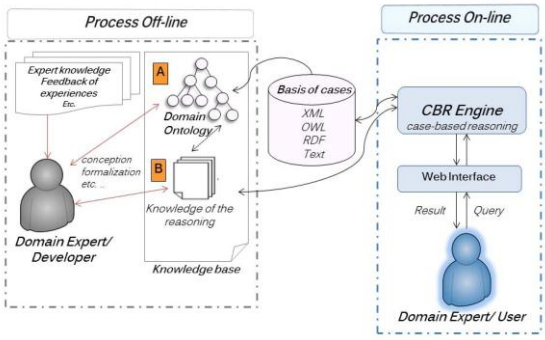

Fig 5.Architecture of CBR

The three main parts of the system are

- Offline process
- Base case
- Online process

OFFLINE PROCESS:

CASE MODEL:

PROBLEM-CASE- [3] describes occurrence of the accident, the dangerous parts, possible causes, and the level of risk.

SOLUTION-CASE -It describes the preventive measures and the possible ways to prevent future reproduction of the accident.

Building an ontology involves 4 steps-specification, conceptualization, implementation, maintenance which is shown in Fig 6.

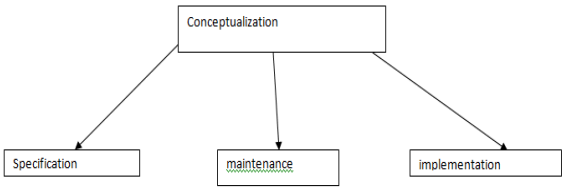

Fig 6.Life cycle of ontology

The specification describes the scope, purpose, domain concepts and the general description. The design principle of ontology describes the name standardization for better organization.

The aim of conceptualization is to identify the concepts, the objects, or the elements in each problem domain. Then organize the concepts in an hierarchy and hence find the relationship among the concepts.

Implementation phase converts the conceptual model into a working model using the ontology languages. The commonly used ontology languages are OWL, OWL Lite.

Maintenance phase is as important as other phases since it deals with upgrading the concepts.

OFFLINE PROCESS:

1. QUERY TOOL:

The goal is to make operational the ontology in order manipulate knowledge represented through mechanisms tailored to the target system already defined.

2. USAGE SCENARIO:

The user can access the main class using an Ajax function which in turn executes an XQuery code for extracting the sub classes and the concepts in the main class.

In the paper [4]. There is a need for a scalable and a extensible knowledge base which supports formal reasoning. It should also be able to accommodate any number of sources of information. We will need formal information security knowledge. Three aspects are considered in the paper before designing a collaborative knowledge base-social, technical, business consideration. In this paper they have used ontology languages such as OWL and many easily available reasoning engines are used to formalize information security knowledge. It also enables easy and automated knowledge retrieval. In order to develop a collaborative knowledge base, which can be used in different sectors like military, business, etc, we can annotate every knowledge fragment, which will indicate the area, type and the security issue. Web-Protégé, which is a open source allows to communicate ontology content to users .however only reliable and authenticated users must be able to retrieve data. Web protégé is the tool that is used in this paper. Authenticated user can view the comments or detailed explanation of the item clicked on the right pane. User can also modify the data.

In [5] analysis shows that the techniques they have used in data mining process. The main tasks in data mining are Classification, Regression, Clustering, Dependency modeling, Deviation detection, Summarization.

Classification- it involves mapping data into one of the predefined classes.

Clustering- it is the grouping of similar objects into clusters to be accessed easily.

Dependency modeling- it is the process of finding relationships between the attribute set.

IV. INFERENCES

- Among the techniques mentioned in the paper, CommonKADS is the only technique that can be considered a knowledge engineering methodology.
- All the techniques support object-oriented approach in modeling activities and their models are platform independent.
- CommonKADS, multiperspective modeling are considered as hybrid approach in modeling as opposed to Protégé which is not a modeling tool in the sense that we use it to draw visual models or diagrams, but it is a tool that allows us to input the knowledge into its knowledge base.
- The modeling part of Protégé is already incorporate into the editing tool that could not be seen by the users.
- However, we can infer that, these techniques do not support scalability. We can achieve scalability by using a better indexing method.

From [4], the information security knowledge base is very dynamic i.e. it can change its contents dynamically. But there are large numbers of threats being exposed daily. So information base is more prone to security attacks. Users can choose their own mitigation process to minimize security attacks. Furthermore a reference model can be added so that it may suggest a solution when other user faces the same problem. From paper [4], we can infer that rather than each company building a new knowledge base, we can create a collaborative base which also only authenticated users to access information thereby ensuring security.

From [5], we can observe that various tools and techniques are used to create and manipulate a knowledge base. But when data in the knowledge base increases the performance decreases. Therefore, a scalable indexing method should be used to store the data in base. [5] does not discuss the scalability issue. But when the number of cases in the base increases it will be very difficult to retrieve the solution.

V. APPLICATIONS

Applications of Knowledge Management in Corporate Intelligence are

- Core part of enterprise decision making needs CI
- Procurement and Spend Analytics
- Supply Chain and Order Management Analytics
- Project Analytics
- Human Resources Analytics
- Sales, Price, Marketing Analytics
- Loyalty, Service, Call Centre Telephony Analytics
- Identify and protect against incidence and investigation of deception, fraud, and corruption

- knowledge based intelligence to inform major strategic decisions or disputes

Knowledge management is also used in other fields like

- Medical
- Legal
- Business
- Social Science
- Transport sector
- Educational fields

VI CONCLUSION AND FUTURE WORKS

In this paper we have analysed the importance of Knowledge Management in Corporate Intelligence as KM is the vital tool required to perform any critical decision in a corporate. Furthermore we have provided an overview of the techniques used in this regard and also have made inferences. Based on that, we observe that traditional Knowledge Management does not support scalability. Future work can be done in this regard by changing the indexing mode to be used for creating knowledge base. Many research issues are highlighted and directions for future solution to cope with these problems are also suggested.

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