

RISK MANAGEMENT IN PERSPECTIVE OF KNOWLEDGE MANAGEMENT A BRIEF SURVEY

REHMAN Zobia

*PhD. Student, Faculty of Engineering, Lucian Blaga University of Sibiu, Sibiu,
Romania, zobia.rehman@gmail.com*

KIFOR Claudiu V.

*Professor, Faculty of Engineering, Lucian Blaga University of Sibiu, Sibiu, Romania,
claudiu.kifor@ulbsibiu.ro*

Abstract: *This article explains the application of knowledge management for project risk management in industry. Combination of knowledge management and risk management is becoming a dire need for industries nowadays, because it has become necessary to make information reach timely to its destined users to achieve the desired goals. Quick decisions are needed throughout a project life cycle to mitigate or avoid a risk, but they are only possible when knowledge about it is in hand and can be inferred for fruitful decisions. Quality engineers make huge effort in analyzing and mitigating the risk and prepare various documents about different risk management stages. But this knowledge resides in documents or underutilized databases without any relation to each other that makes it useless for complex decision making. This article shall explain how knowledge management activities are helpful in risk management and the advantages of their fusion. It will also present a conceptual architecture of an Information Technology based solution for risk management and knowledge management combination.*

Keywords: Risk management, knowledge management, knowledge based systems.

1. Introduction

Lack of information leads to uncertainty and each uncertainty is a risk [5]. Risk is a probable frequency and magnitude of future loss [7]. Risk management reduces the impact of ill-fated events and maximizes the realization of opportunities by risk identification, assessment, and prioritization [5]. Project risk management is an important and obligatory step for successful project management. Risk can occur at any phase of project life cycle, for example in design, development, or production. Effective risk management ensures the completion of a project in defined budget, according to schedule, and fair achievement of targets. Risk management teams monitor every phase of the project development life cycle for risk occurrence, and prepare mitigation plans to eliminate or reduce the impact of it. Risk management relies on a set of four activities; identification of a risk, its quantification, deciding response for it; and monitoring and controlling it [9]. Identified risk is evaluated on the basis of quantity, and it is categorized as low, medium, high, or critical. How frequently a risk occurs and how does it impact a project are two measures to categorize a risk. It can be responded by avoiding it, passing it on, taking corrective measures to reduce its impact, or by a simple acknowledgement. It is continuously monitored to follow changes in it and to identify new risks [10].

Knowledge Management (KM) emphasizes on carrying out activities needed to fully exploit knowledge resources [1]. According to authors in [4] KM is a process to accumulate, distribute, and effectively utilize organizational knowledge resources. Authors in [11] define KM as a strategy adopted by organizations to make sure in time availability of the knowledge for its destined users in order to achieve organizational objectives. One can describe KM as a process of creation, validation, presentation, and distribution of knowledge [2]. According to [3] KM is a combination of actions, infrastructure; and technological and managerial tools that is intended to create, share and leverage knowledge within and around the organization. KM is a combination of processes used to add and generate value [8].

Major activities of KM are identification, creation, representation, distribution and adaptation of heuristics of individuals or organizations. Knowledge gathering (collection of knowledge on subject matter), knowledge organization and structuring (designing a structure for acquired knowledge for its effective management), knowledge refinement (upgraded knowledge maintenance by concerned persons) and knowledge distribution (making the knowledge available for its users) are major activities followed in organizational knowledge management [14].

Knowledge management activities are helpful for each phase of risk management. It helps organizations to identify their risks more clearly, provides techniques to make intelligent risk assessment and supports decision making for risk control. Knowledge based systems are Artificial Intelligent programs that store experts knowledge in a knowledge repository (knowledge base) and reason through it to solve complex problems. Such systems can be helpful for selecting a response for a risk.

Section 2 describes mapping of risk management and knowledge management activities, and section 3 concludes the article along with future directives.

2. Combining Risk Management and Knowledge Management Activities

Integration of risk and KM has certain advantages over stand alone risk management. As KM activities enable to catch the heuristics of available and remote experts, make reutilization of knowledge available on web, organization repositories, and past reports; therefore the combination of KM and risk management helps generate Knowledge-Based Risks (huge organizational repositories with complete tracks of past risks and learnt lessons) which are sharable across the organization [13]. It also helps formation of virtual risk management teams and virtual forums to share knowledge and expertise. Combination of these two management approaches turns an organization into learning environment. Risk management teams can discover risk knowledge from past lessons to innovate methodologies for its handling. This combination makes full utilization of communication technology to collect and disseminate risk knowledge among peers and find collaborative solutions. Following subsections explain how KM activities help improve the understanding and implementation of risk management; and figure 1 shows that each risk management activity involves almost all phases of KM process.

2.1. Risk identification

Risk identification is the process of identifying all probable risks associated to a product or process, it gathers the information about all aspects a product or process can go wrong. List of all probable risks is generated through organizational discussions, brainstorming, experience of senior employs, and previous documents of risk profiling.

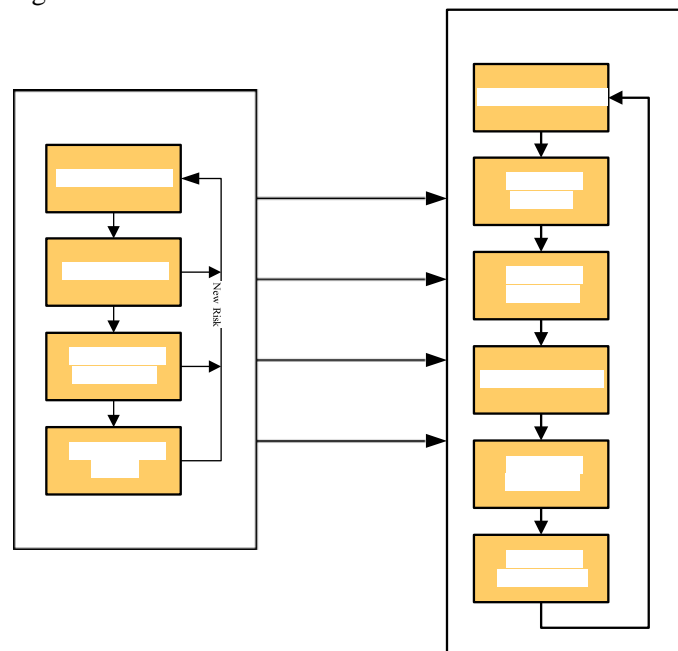


Figure 1: Mapping of Risk management activities to Knowledge management activities

2.2. Risk assessment

In this phase a risk is analyzed for its impact on a product or process. Magnitude of the probability of its occurrence and the damage it can cause is calculated during risk assessment. Risk is categorized as acceptable, if it can be understood and tolerated [6]. Some prominent risk assessment tools are; scenario analysis for event probability and impact, risk assessment matrix, Failure Mode and Effect Analysis, probability analysis; and Semi-quantitative scenario analysis [12]. Information about this phase can be generated from experts' views according to previously prepared analysis documents.

2.3. Risk response development

In this phase an assessed risk is assigned an appropriate response. It can be mitigated, avoided, transferred, or retained [12]. Risk response selection is a conscious decision taken by risk managers after experts' discussions and past experiences.

2.4. Risk response control

In this phase risk response decisions are executed. Risk is monitored to track the impact of response on it, contingency plans are executed and new risks are identified [9].

Following is the summary of KM activities carried out through out risk management process.

1. Knowledge about risk is created by involving experts and using organization repositories, assumptions are identified, processes are conceptualized, mitigation techniques are identified and selected, and new models are developed for representation and storage of knowledge.
2. If identified risk is new then new knowledge is captured for it.
3. Newly created knowledge is structured for its reusability, Meta data is decided to structure knowledge, mind maps and discussion outputs are converted to taxonomies.
4. Captured knowledge about risk is populated in organizational repository, documentation process are identified, human knowledge is codified, existing data is indexed according to its affectivity provided during the modeling process of a new risk.
5. It is made available for all users at all time using presentations, portals, discussion forums, reports, and intranet/internet.
6. Finally for a particular risk all captured knowledge is used to make final decisions. That is actually application of knowledge refined after passing through all stages of risk management and KM.

Figure 2 represents the technological view of this fusion. Conceptual model of knowledge based system presented in figure 2 can be deployed for project risk management. This model proposes capturing of knowledge from knowledge managers, organizational experts, World Wide Web, blogs, social networks, discussion forums, traditional data management systems, and organizational document repositories (any file containing text). Aligner, parser, and knowledge based editor are to structure (this structure can be acquired using rules, ontology structures, or by any other natural language processing or machine learning technique) the gathered knowledge and give it a uniform pattern in order to store in a risk knowledge base. Risk knowledge base is connected with inference engine. Inference engine uses the knowledge of risk knowledge base to make decisions for the current risk which lies in working memory. It can also update risk knowledge base if it identifies working memory risk as a new one. This model also supports dissemination of knowledge across users, experts, and organization's intranet/internet through different interfaces.

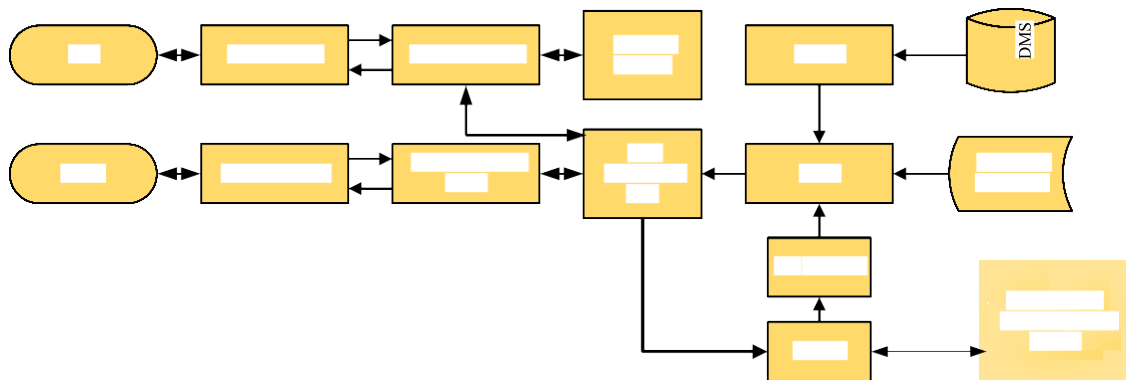


Figure 2: A conceptual architecture for a risk knowledge based system

3. Conclusion

Knowledge capitalization of any industrial process can bring value to an organization. Knowledge is a typical volatile intellectual property of an organization. We cannot say that an organization keeps all its required knowledge and procedures in its repositories as most of it is found in expert's head. When an expert leaves an organization he also carries away all his experiences and knowledge learnt over years from organization. Knowledge management fusions with other industrial activities can be helpful in retaining knowledge capital of an organization.

Effective risk management is essential for organizational sustainability. Complete knowledge of a product or process, associated risks, expert's reviews and past experiences must be in hand for effective risk management. This is why combination of risk management and knowledge management is becoming a trend in modern quality engineering. In this article we discussed how knowledge management activities support different phases of risk management and we also proposed a risk knowledge based system that

allows capturing tacit and explicit knowledge across the organization, structures that unstructured knowledge, maintains a knowledge base for all possible cases, and allows dissemination of it.

Nowadays we are working on semantic recycling of existing knowledge about risk assessment activities found in Failure Mode and Effects Analysis reports. In future we are aimed to develop a comprehensive Information Technology based platform to support risk management and knowledge management fusion.

4. References

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