

The Research on the Method of Process-Based Knowledge Catalog and Storage and Its Application in Steel Product R&D

Xiaodong Gao^{1,2} and Zhiping Fan¹

¹ School of Business Administration, Northeastern University,
Postal Code 11 00 06 Shenyang, China

² Shanghai Baosight Software Co., Ltd, Postal Code 20 12 03
Shanghai, China

gaoxiaodong@baosight.com, zpfan@mail.neu.edu.cn

Abstract. Efficient knowledge storage is for easy to look up and speed up the reaction. Knowledge resource library stored large amount of knowledge achieve, and it can be distill through all kinds of links. Technically, there are two concerns, one is to index through what kind of related strategy, establishes keyword controls, in order to apply the standard literature management tools, the other is how to adopt efficient storage strategies, in order to index and update the knowledge system fast, this thesis takes the operation process as a starting point, investigates the organization strategies towards knowledge classification process and storage, as well as provide a practice case based on research and develop of the steel product.

1 Introduction

Most of the organization works are enclosed by the operation process. Operation process refers to a set of activities which rated together to product values for the customers. Porter describes the operation process of an enterprise as a value chain, competition happens not among the enterprise, but among the value chain of them. Only through efficient management of all the aspects of the value chain, could the enterprise gain the true competition advantage on the market. Processes in organization establish the interactive relationship among the employees, responsibilities, performance and knowledge, through process the enterprise can establish knowledge research system of an organization, and apply it on manufacturing practice and knowledge innovation. The key for its technique is the classification and storage strategy of the knowledge.

2 Knowledge Correlation and Classification

Knowledge correlation refers to the relationship and influence between events, which means to establish the specific relationship based on the different knowledge

requirement. Not a kind of the knowledge innovation deviate from the application of the existing knowledge, In other words is to say the knowledge has the necessity relation with the others, likewise, any kind of the research work needs the other science knowledge as an assistant, without the matting of the other knowledge, the research can not develop. To resolve the series of problems inside an organization requires the related knowledge, background knowledge etc. This related knowledge is what we call the knowledge correlation.

Generally, based on the operation process of the business management program, and strings together the straight forward related knowledge to form a methodical knowledge network, and describe it by language, characters and graphics. Therefore the method of knowledge correlation is the key of the knowledge storage. Figure 1 is the example of the knowledge system of computer maintenance.

Knowledge correlation and knowledge classification have a straight forward relationship. Knowledge classification can be concerned as an infinite and constant development. It is impossible for a rich and colorful world to contain only one classification. Therefore, we can not find only one classification to satisfy the entire knowledge requirement. Knowledge system based on process is also a kind of knowledge classification. Its goal is to operate process and deliver knowledge easily, therefore convenient for knowledge application and innovation.

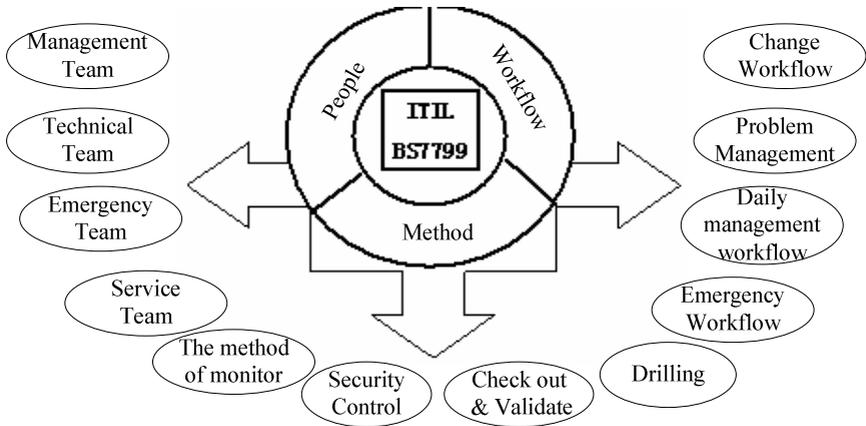


Fig. 1. The knowledge system of computer maintenance

3 Keywords System Based on Process

As all we know, Enterprise’s operation system is based on process. The organic amalgamation among the operation processes consist the operation system of an enterprise. Moreover, Process is consisted by a few working procedures, these procedures are corresponding with working position. In order for the process to be running smoothly, all the working positions need to be cooperate efficiently. Therefore

the operation situation of the whole process is due to the efficiency of all the position. Every position includes the following knowledge elements:

- Performance**, which include time, quality, cost, service, and improvement
- Methodologies**, refers to technical files and working procedures which need to accomplish the target performance
- Hardware**, refers to the working situation and environment which need to support to accomplish the performance
- Communication**, refers to the connections between the up strings and down strings of the employment positions.

Useful knowledge exists in the operation process of an organization. It has been long-term used by the employees and produces the specific benefit. The organic amalgamation of the performance, methodologies, hardware, and communication consist of a knowledge node inside the process, the output information of the position is the input of another, and the amalgamation of all the knowledge (position) forms the knowledge system based on process, Figure 2 is the example of process based knowledge factor.

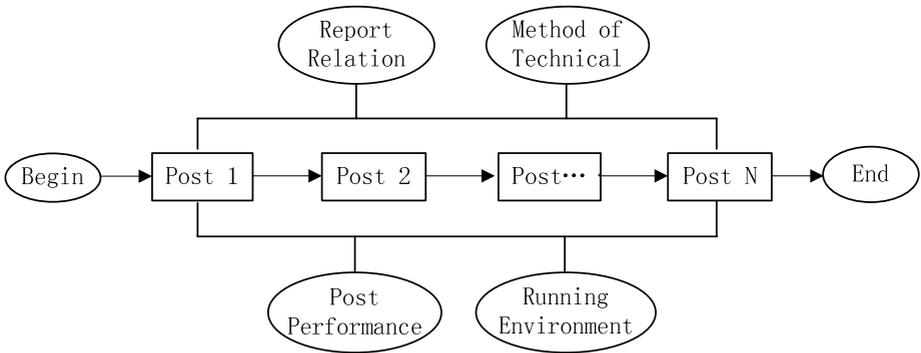


Fig. 2. The sample of process-based knowledge factor

For organization’s efficient knowledge classification, apply a standard archive management tool, a keyword control system needs to be established. This system shall be standard, authorities, and hierarchy. Mostly, 1) keywords dictionary explains and interpret for every keywords, no second definition 2) human resource dictionary based on the keywords of employees identities, includes the personal information , and experience 3) knowledge dictionary based on the relationship between keywords dictionary and knowledge resource 4)keyword correlation dictionary based on the keywords dictionary establishes a multi hierarchy process framework 5) project knowledge correlation dictionary based on keywords, establishes the project knowledge relationship 6) operation knowledge correlation dictionary based on keywords establishes the relationship among the operation knowledge.

4 The Transformation Between Structural Data and Non-structural Data

In information system, technically there are two categories, the structural system and non-structural system. The data processing function in structural system together with the related strategies in non-structural system can be classified in two parts, the information linkage and function linkage 1) information linkage, to have the straight connection for the data inside the database, technically it is very difficult, this needs to transform the data into information, for example to transfer the personal date into the personal information and store them as a non-structural archive. e.g.: Through HTML format transfer every employee's personal data into an information file, and use its employee number as the keywords, this can transfer the structural data into information, and can be applied by the non-structural system.2) function linkage based on the process ability of database, through WEB/EAI technique, this can be the service application.

On the other hand, every knowledge archive needs to obey the archive criterion. For example, Dublin core centralization has its definition for topic and keywords, title, author, abstract and publisher. According to the number of times for the knowledge application, the relatively aged knowledge, its demand for query going down, therefore needs to be rearranged and increase the operation efficiency.

5 The Storage Framework Based on the Knowledge Unit

Knowledge storage strategy can be classified as centralized storage and decentralized storage. It is feasible to utilize the centralized storage for small amount of knowledge storage; it has simple structure, small investment and fast result. But, when the knowledge storage exceeds a certain limit, centralized storage will cause problem, since the large demanding will cause the problem for accessing, therefore speed down the reaction. To spend up the reaction, the system dimension and functional requirements needs to be significantly improved. Therefore increase the investment.

Through practice analysis, it is non-proportional between knowledge innovation and query. Knowledge innovation has much smaller scale than knowledge query. Therefore, to establish a unilateral data synchronized system, through unilateral data source innovation multi-direction data duplication, can guarantee the fast innovation and query of knowledge. A general multi-piece technique product has fast data duplication ability, like IMB, Lotus-Domino system.

Technically, use the micro pc server system to separate knowledge innovation and query, together to support the compression of query, this guarantees the fast reaction system, As fig 3 shows.

Generally, the knowledge construction inside the knowledge center is based on the knowledge field; the enterprise can establish the knowledge warehouse step by step according to its ability, like the manufacturing management knowledge unit in the knowledge operation, and project module knowledge unit in the project knowledge

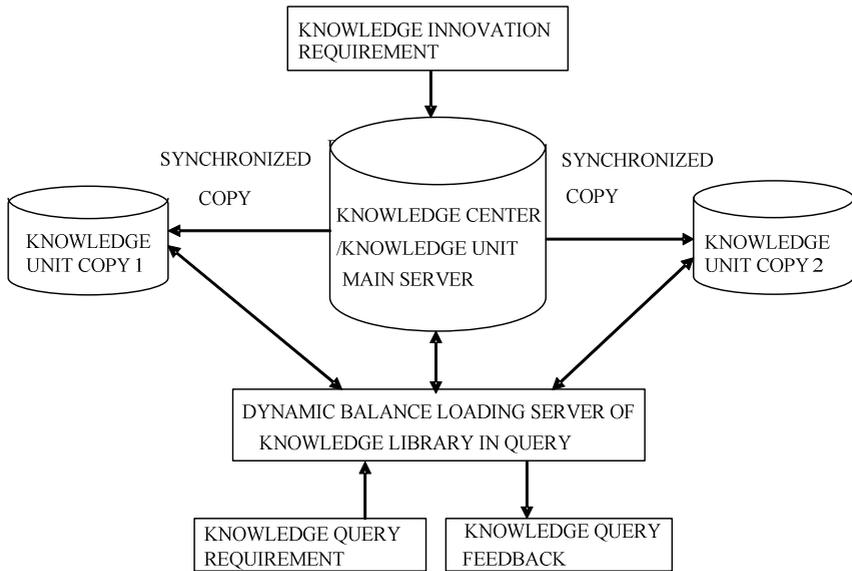


Fig. 3. The overload-balance strategy of knowledge storage

center. Therefore, as the above diagram, we can use the innovation requirement content of one knowledge unit. With the responsible for a server which is the main server, and apply the method of timing innovation, then describe the content to the other by-server,, and by them through the balance loading server, organize the query assignment distribution and feedback to support compressed inquire requirement.

Besides, the by- server of the knowledge unit is the backup system of the knowledge center/ knowledge unit, in case the main server shuts down, the backup system can be switched to be the main server and continue to operate. The main server and the by server, balanced loading server is a logical concept. For a system that has not been frequently visited, it can be configured on a physical device, once the large visits happens, it can be distributed on different physical devices, Thus, apply the micro server, invest a small cost can achieve the flexibility of the system and security of the hardware.

6 Case Application: Process Based Knowledge

Process based knowledge system and its application on the steel product design and development.

The development process of the vehicle plate is based on the specific customer, and organized through a standard recognition process. Therefore, all the project

organization and its related archive classification of the vehicle plate shall be strictly controlled according to three kinds of key techniques (varieties, techniques and application), two key objects (end user, trial-manufacture procedure). Besides, key elements can be increased by the specific project. For example: the type of vehicles, the steel and the number of the projects etc. All these consists the keywords of the vehicle plate knowledge archive.

The so called the high ranking vehicle plate is the kind to satisfy the demand of the inside plate of a medium and high ranking vehicle, it possess the excellent mechanical functionality and cold roll steel as well as the zincification thin steel plate of the surface quality. This is the most elaborate work in the steel product, it has the great difficulty to produce and develop, specifically shows: 1) the large demanding of the vehicle plate. 2) The fast changing of the vehicle style, this cut down the period of changing. 3) The high requirement of the surface plate, this cause the difficulty to manufacture. 4) The automatic pipeline of the vehicle manufacturing which demands the high stability of the steel plate quality. 5) The long time manufacturing workflow and lots of the technical difficulties and high integration.

Through the control system of the key techniques and key objects, together with the visualized techniques to form a visualized vehicle research and development knowledge map. Thereby, the project office can easily choose the related project data for a specific project based on the knowledge map. The main workflow is inside the keywords system of the vehicles plate, according to the specific project keywords. Choose the appropriate project archive through the knowledge system of the technique, product, product application, end user, development workflow, and then deliver the archive to the project and its related product research data, similar technique environment and its research project, the application date of the specific user. Once the new data has been produced, it can be delivered together to the virtual environment of the project.

Abstract the keyword system through professional knowledge, thus the keywords system of a certain profession is consisted by keyword orders (technique order), they interlaced compose a knowledge network. The arrangement of the keyword system in the professional area is the important technique work for the project office. Only to establish the efficient professional keyword system, can one visually understand the development of the professional field and its existing working position (purpose and direction).

7 Conclusion

Knowledge delivery is the new trend of an enterprise's knowledge application and innovation. Through the study of this thesis, we know that knowledge can be organized through process. In order to improve the delivery efficiency, the enterprise needs to establish the dynamic linkage and its protection strategy for of activity, knowledge resource, position/ employee, and apply the knowledge storage system based on the balance loading, resolving scheme.

References

- [1] Portor M. Chen Xiaoyue interpretation, Competition Advantage[M]. Beijing, Publishing Company, 1997.
- [2] Nancy M. Dixon, Common Knowledge --- How Companies Thrive by Sharing What They Know[M]. Harvard College 2000.
- [3] Despres C, Chauvel D. Knowledge Horizons: The Present and Promise of Knowledge Management [M]. Berlin: Butterworth-Heinemann, 2000.