USE OF KNOWLEDGE MAPS TO RECOGNIZE DIFFERENT RESEARCH CAPABILITIES

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Abstract: *Knowledge Map is a Knowledge Management tool which shows the creation, storage places and main holders of knowledge. It contains implicit information about the knowledge processes. A Knowledge Map might reflect knowledge gaps, in which case can be used as a starting point in the Knowledge Management analysis. The paper will try to describe the sophisticated process of building the Knowledge Map which can be easily used in organizations and companies in IT sector. There will be examples of explanation of Knowledge Maps which can help to find the research capabilities for manufacturing area.*

1. INTRODUCTION

Over the next few years there should be an increased emphasis on taxonomies, ontologies and Knowledge Management tools. These tools are very helpful in the process of creation the commonly-shared knowledge bases. For example, these bases can be a collection of knowledge and experiences of groups of individuals available in organization.

Knowledge Map as a one of the Knowledge Management tools is a navigation aid to explicit information and tacit knowledge, showing the importance and the relationships between knowledge stores. This software tool was specifically designed for Knowledge Management. Knowledge Map contains a list of information like "who knows what". In that case it is possible to say Knowledge Maps work in some circumstances just like yellow-pages.

It is a proper to remember that Knowledge Map does not store knowledge. It just points to people who own it, creating opportunities for knowledge exchange.

There are three types of Knowledge Maps:
- Procedural Knowledge Map,
- Conceptual Knowledge Map,
- Competency Knowledge Map.

Procedural Knowledge Maps can reflect knowledge mapped to a specified production process for example.

Conceptual Knowledge Maps are a hierarchical classification of things which according to Knowledge Management experts could also be called a taxonomy. Competency Knowledge Maps can support the process of creation a competency profile of a researcher and his research capabilities.

In this paper there will be couple of examples of Conceptual and Competency Knowledge Maps which can be used not only for support knowledge flow in organization but also to support knowledge about some aspects in industry.

Many companies around the world already use Knowledge Maps to transform their employees into knowledge partners, focusing the organization on the most critical issues facing the business.

According to Applied Learning Labs experts, Knowledge Maps are customized to meet each client's unique needs, whether those needs be company-wide strategy communication or executive leadership training.

For example, employees that experience a Knowledge Map learning process will typically:

-be asked to challenge their attitudes and assumptions,
-review and understand marketplace data that supports the need for change,
-seek understanding and collaborate with others in the group to acquire new knowledge about customers, competitors and internal performance,
-develop new conclusions about the business issues being explored,

-determine their role in dealing with the business issues and what it will take to create success for the company, as well as for themselves,

-identify and internalize the specific action steps they must take to realize this newly determined role.

It is possible to say that Knowledge Maps are the first step of creation useful Knowledge Management system in organization. These maps allow employees which are responsible for Knowledge Management to built the KM system based on their own documents [1],[4],[6],[11].

2. METHODOLOGY OF KNOWLEDGE MAP BUILDING

Just as in organization, Knowledge Maps, as it was written earlier can support the process of creation a competency profile of a researcher and his capabilities in specific research area. This Knowledge Management tool can also be used to present the knowledge about some aspects of industry.

For example, Conceptual Knowledge Map can in a simple and clear visual format present which products are produced in specific machine industry sector and by specific industrial companies.

Many Knowledge Map systems have a knowledge tree construction. In aspect of research capabilities, that kind of construction can represent the potential of specific research area resources and can give a dynamic vision of available competencies.

If we want to have a complete Competency Knowledge Map which will be a visualization of researchers' capabilities for manufacturing area, we must first collect and formalize this knowledge.

The process of collection and formalization is a first, vital step to transform the knowledge of the researchers within the manufacturing area to a common representation of knowledge in the knowledge base.

In this process researches will be linked up with experts from different manufacturing areas in order to permit the discovery of which knowledge may be shared between them.

One of the methods of successful collection of knowledge about competencies of the researchers in manufacturing area is to develop a questionnaire. The strategy for the construction of the questionnaire can be divided into three main actions:

-Development of the questionnaire,

-Definition of the competencies and indication of possible info contributions,

-Analysis of the replies to the questionnaire and finalization of domains of interest.

Results of that kind of questionnaires can show some tendencies that allow create some indicators in

the sophisticated process of building Competency Knowledge Map.

This process must be based on defined knowledge hierarchy:

-Research area (in manufacturing)

-Domain

-Expert (Researcher).

After the process of preliminary allocation of domains to the researchers the Knowledge Map makes it possible to find the expert we are looking for.

This process of building the Competency Knowledge Map can be of course easily used in organizations and companies in IT sector. In a simple way any employee of the company can get the information about core competencies of his work partners.

The Competency Knowledge Map methodology arose from a simple belief that employees will only act on those competencies that they are close to their own activities.

The building process of the Knowledge Map about metal products of polish mechanical industry was of course proceeded by preliminary process of knowledge mapping. This Knowledge Map illustrates the knowledge about these products which can be divided in groups:
- metal products,
- machine tools.

The next phase of building the Knowledge Map depended on creating the connections between entries (in this the case the different types of metal products and machine tools).

During the extending process of the structure of Knowledge Map it was very important to check the efficiency of navigation the Knowledge Map. Optimization of efficiency of that navigation is a factor which facilitates the access to information we are looking for. Therefore sometimes was a need to make corrections in the map structure [1],[8],[11].

3. EXAMPLE 1 - KNOWLEDGE MAPS ABOUT COMPETENCIES OF THE RESEARCHERS IN MANUFACTURING DOMAINS

Following Knowledge Maps were built in two different software tools: IKM tool and MindManager tool.

IKM tool (InfoRapid KnowledgeMap 2004) as a shareware version is enough complex and has very friendly interface what is very helpful.

As it was written earlier the following Knowledge Maps have knowledge tree construction. This Knowledge Map System gives user the opportunity to start the searching process for an expert in the

specific domain of research area. Result of that searching process is the name of this expert.

The IKM software gives user also the opportunity to extend the Knowledge Map via internet. The user also can give potential links to other maps.
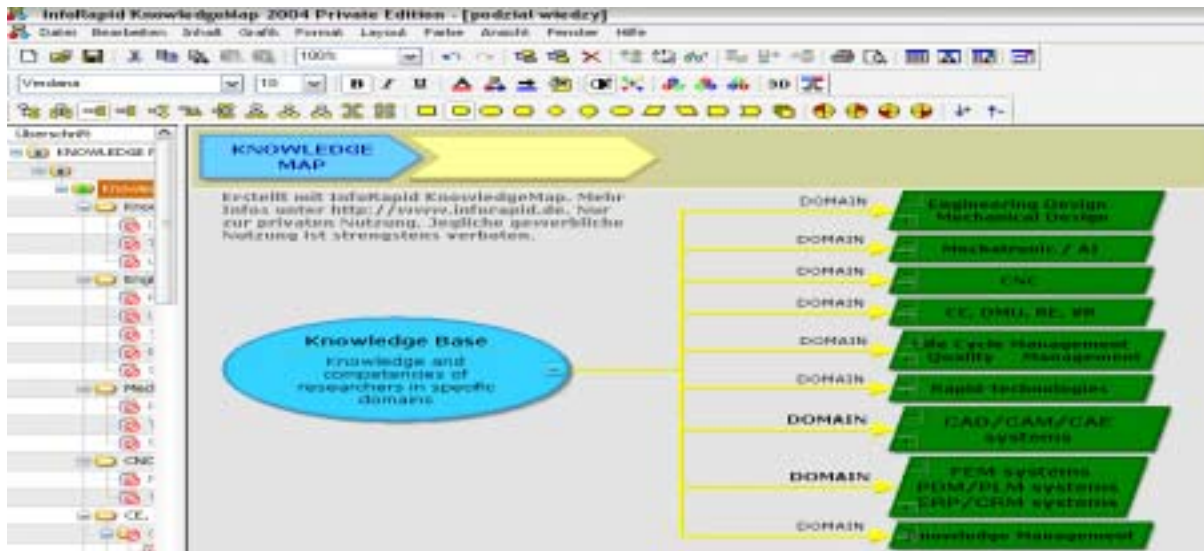

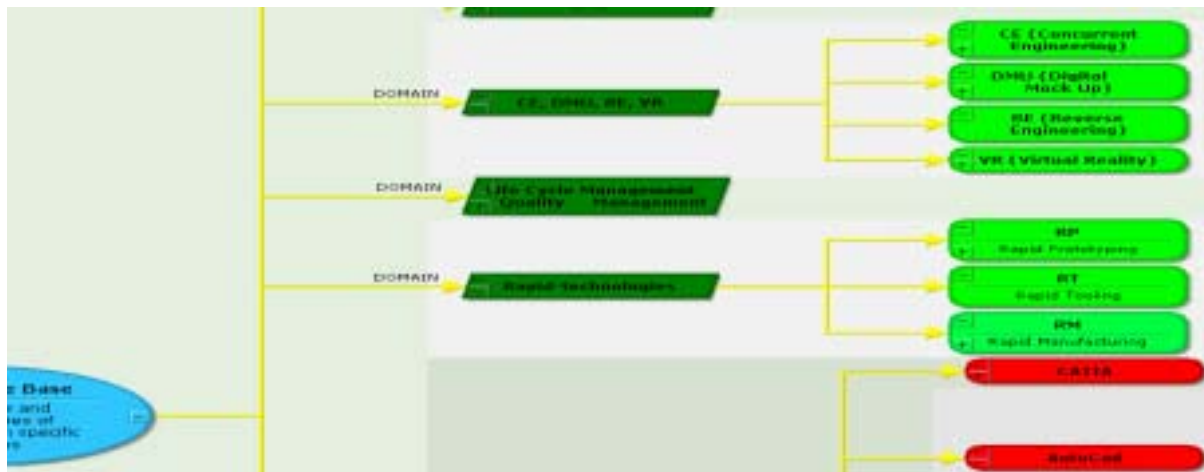Fig.1. *Knowledge Map – specific domains in manufacturing area (IKM tool).*

Fig.2. *Knowledge Map – construction (IKM tool).*

Fig.3. *Knowledge Map – result of a searching process (IKM tool).*

MindMapper tool is a shareware Knowledge Map system which empowers user to capture ideas, improving thought processes and providing a fast and easy method for multi-person collaboration.

MindMapper software enables a multi-point of views presentation for each item of the map. Furthermore, additional information will be easy to add in the future [2],[3].
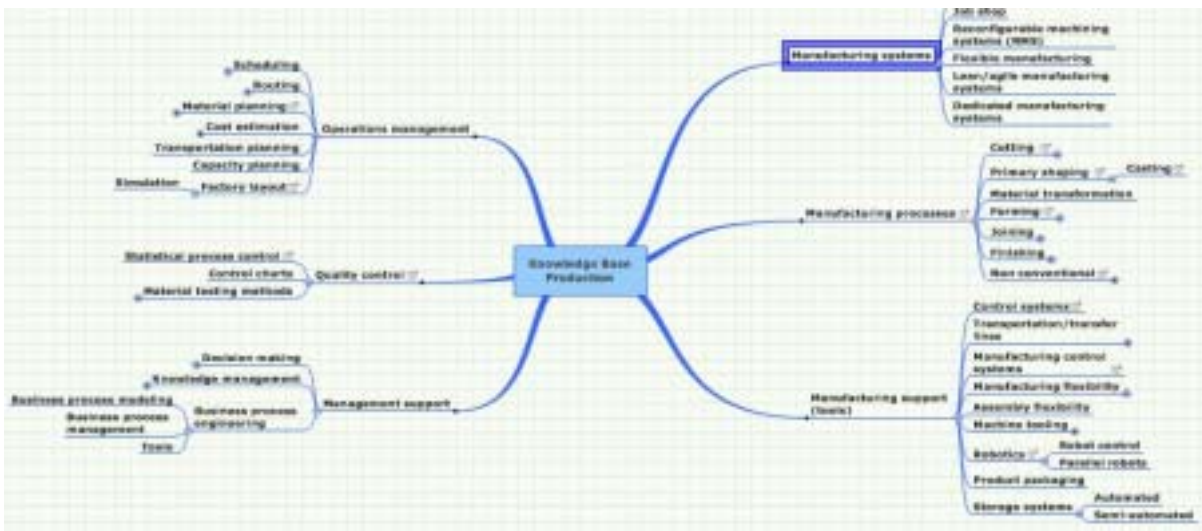
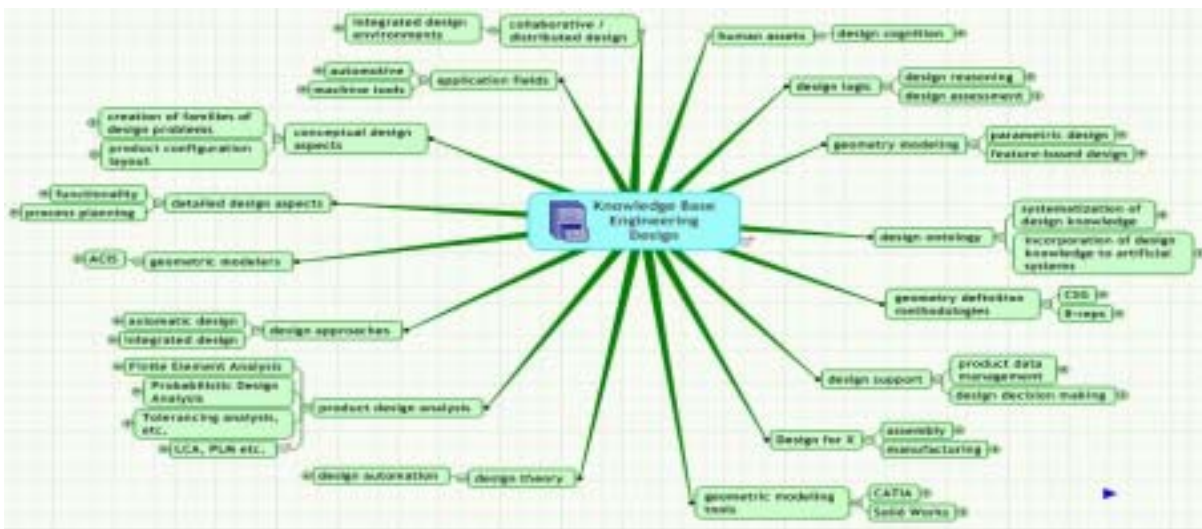Fig.4. *Knowledge Map – tree of manufacturing processes and systems (MindManager tool).*

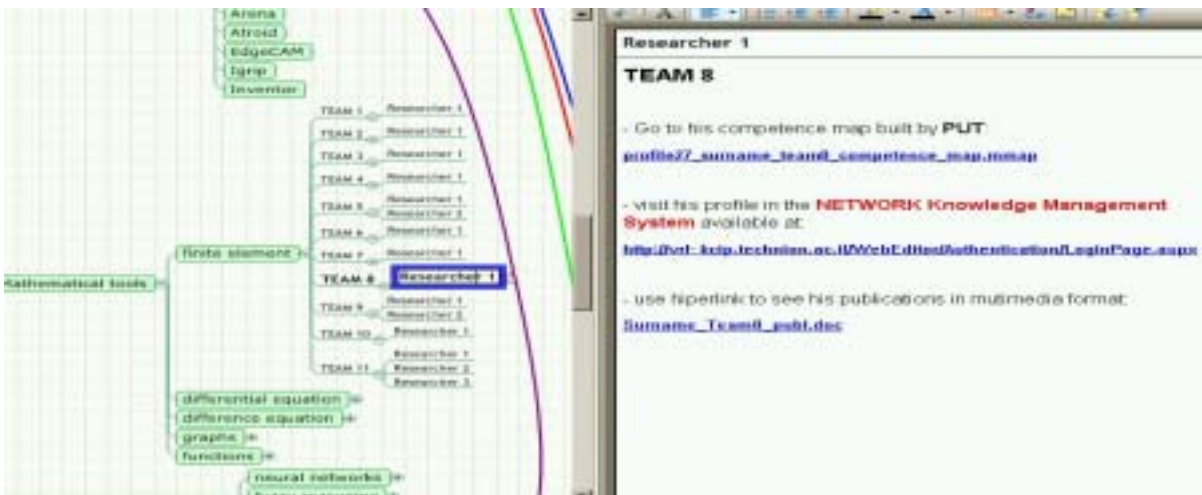Fig.5. *Knowledge Map – tree of Engineering Design (MindManager tool).*

Fig.6. *Information about expert in research area (MindManager tool).*

4. EXAMPLE 2 - KNOWLEDGE MAP ABOUT POLISH MACHINE INDUSTRY

Polish machine industry, which expanded during the 1970s traditionally exported a large proportion of its output to the eastern European countries, with which some joint ventures were established. Under license, with Western firms, Polish machinery plants produced mobile cranes, heavy truck axles, hydraulic equipment, truck-mounted concrete mixers, and other construction machinery. In the 1990s, the highly centralized, bureaucratic construction machine industry was reorganized into a large number of small- and medium-sized private firms. The following Knowledge Map contains the information about machine industry products and producers.

The hierarchy of entries as well as connections among them is also presented on following drawing. The different types of Knowledge Maps can be in a simple compatible way adopt to modules of the Knowledge Management System. As a visual imitation of connections between entries, effective Knowledge Map is an invaluable instrument then.

So, it is possible to say that the user of KM System can navigate the Knowledge Map and in a simple way can get the knowledge, in this case about what type of metal products are produced in our country at this time [7].
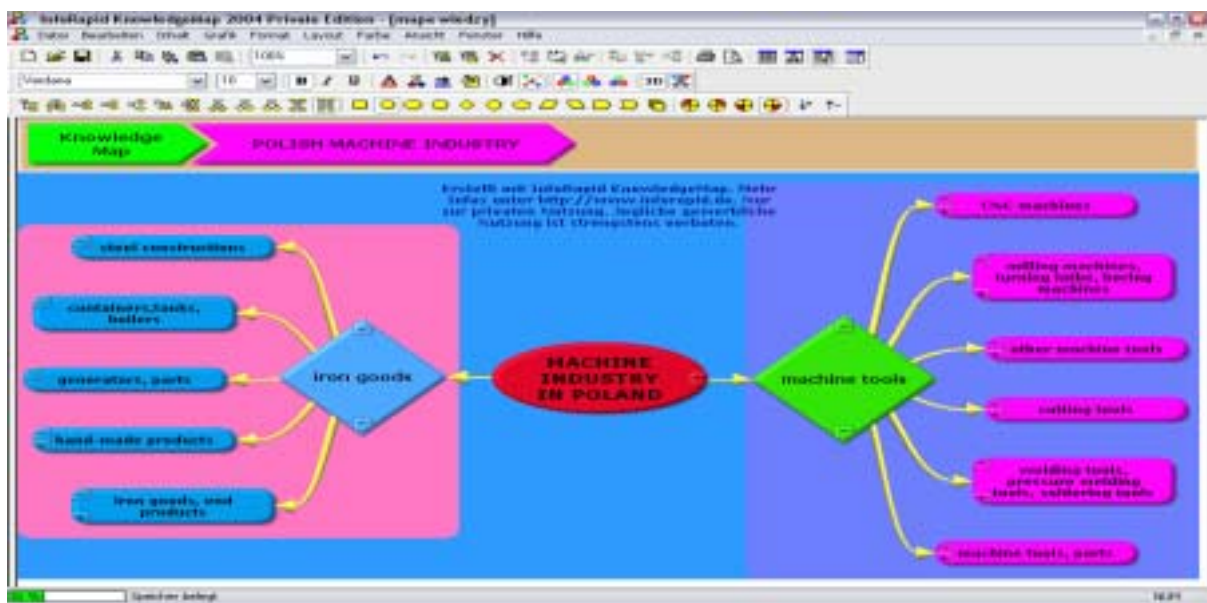

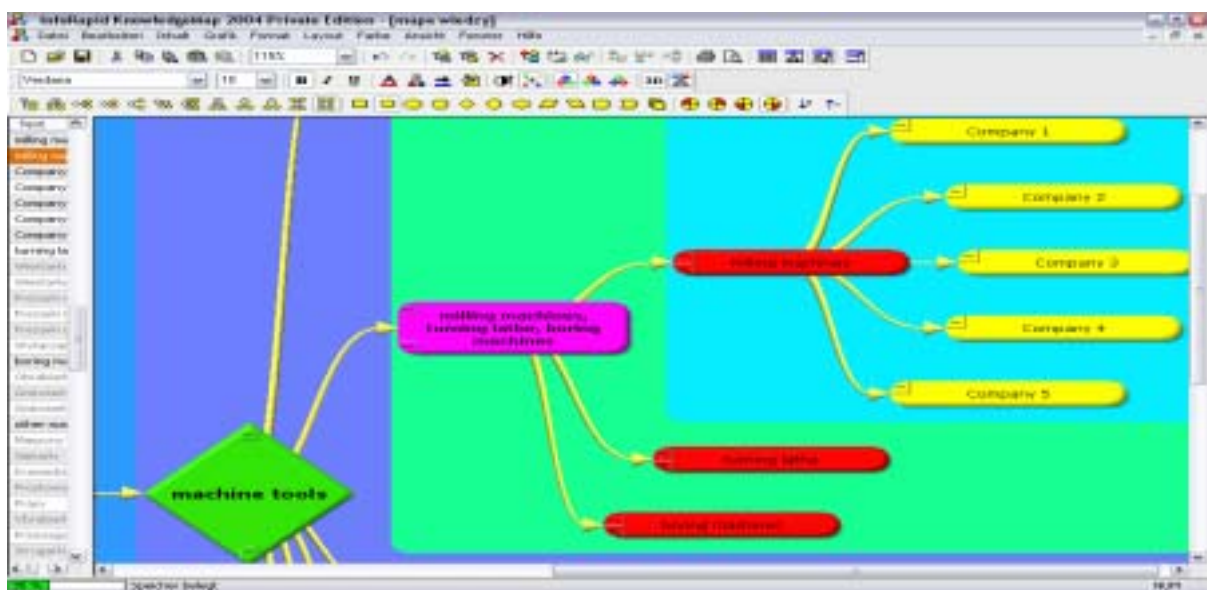Fig.7. *Knowledge Map – Polish Machine Industry (IKM tool).*

Fig.8. *Knowledge Map – Information about production of machine tools (IKM tool).*
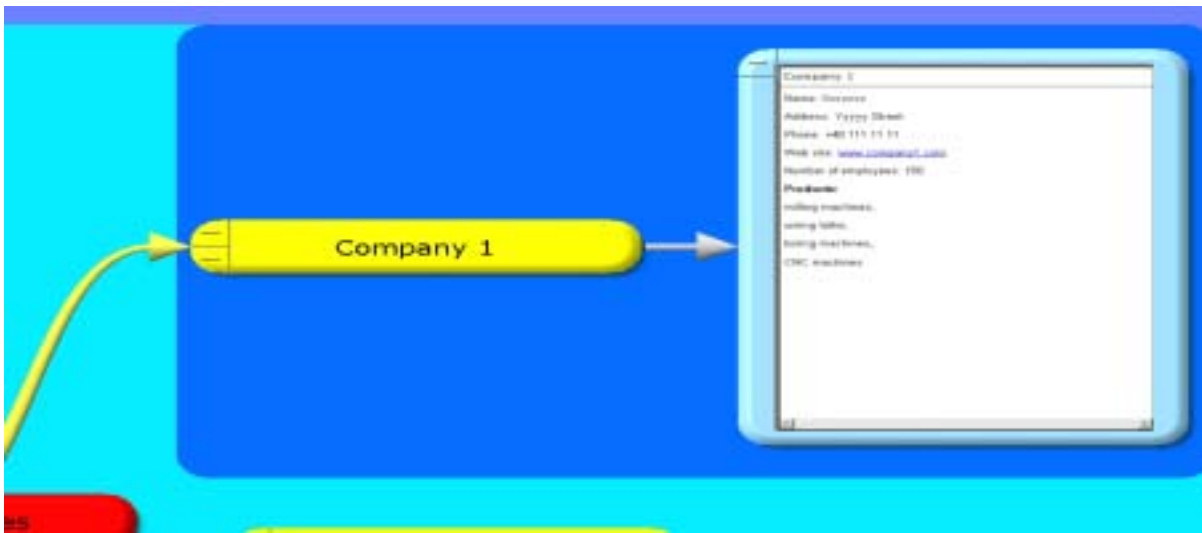
Fig.9. *Knowledge Map – Detailed information about producer of machine tools (IKM tool).*

5. CONCLUSION

The Knowledge Map can become the basis for a Knowledge Management program in organization, a set of Knowledge Management activities within a business initiative, or even a Knowledge Management project. Examples of Knowledge Maps which have been described earlier show that competencies can be captured on this tool. The map is then used for a competency and skill development plan for example.

As a component of the Knowledge Management system, Knowledge Map can also define the initial parameters for a knowledge audit which is an inventory of key knowledge and locations of this knowledge. It can also be expanded to include definitions of owners, users, and uses of this knowledge.

As a simple visual format that is easy to understand and is easy to update and evolve, Knowledge Map can present in a simple basic way the general condition of polish machine industry.

It is a clear example of which products are produced in specific machine industry sector and by specific industrial companies [9],[10].

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