



Knowledge maps: A systematic literature review and directions for future research



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ABSTRACT

Context: Nowadays the concept of knowledge mapping has attracted increased attention from scientists in a variety of academic disciplines and professional practice areas. Among the most important attributes of a knowledge map is its ability to increase communication and share common practices across an entire organisation. However, despite being a promising area for research, the knowledge maps community lacks a widespread understanding of the current state of the art.

Objective: The objective of this article is to explore the world of knowledge mapping by reviewing and analysing the current state of research and providing an overview of knowledge mapping's concepts, benefits, techniques, classifications and methodologies, which are precisely reviewed, and their features are highlighted. In addition, we offer directions for future research.

Method: Based on the systematic literature review method this study collects, synthesises, and analyses numerous articles on a variety of topics closely related to a knowledge map published from January 2000 to December 2013 on six electronic databases by following a pre-defined review protocol. The articles have been retrieved through a combination of automatic and manual search, hence extensive quantitative and qualitative results of the research are provided.

Results: From the review study, we identified 132 articles addressing knowledge maps that have been reviewed in order to extract relevant information on a set of research questions. We found a generally increasing level of activity during this 5-year period. We noted that while existing research covers a large number of studies on some disciplines, such as systems and tools development, it contains very few studies on other disciplines, such as knowledge maps adoption. To aid this situation, we offer directions for future research.

Conclusions: The results demonstrated that a knowledge map is an imperative strategy for increasing organisations' effectiveness. In addition, there is a need for more knowledge maps research.

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1. Introduction

Knowledge maps have received increasing attention as an important subfield of knowledge management, where they play an imperative role. It helps to describe what, how and where to find useful knowledge within an organisation (Eppler & Simon, 2008). Several objectives can be acquired when utilising knowledge maps. Some organisations view it as an activity that can help with their strategic planning, while others may use it as a basis for knowledge transfer. It can help to move towards ‘empowerment of the organisation’ which ‘involves providing access to existing information and expertise’ (Hellström & Husted, 2004). In other cases knowledge maps have been used to represent the views of participants and their mutual relations to other views, as well as illustrate the dependencies of learning paths and serve as the basis for the implementation of knowledge management programs (Dang, Zhang, Chen, & Larson, 2011; Einsfeld, Ebert, Kerren, & Deller, 2009; Ivanov & Cyr, 2006; Kim, Suh, & Hwang, 2003).

In all cases, it deals with the problem of how best to visualise knowledge assets in order to perform specific activities, particularly when organisations that value knowledge would like to recognise how, when and where to access knowledge. This is where a knowledge map presents a snapshot of where an organisation is at any given time comparative to its competitors (Wexler, 2001; Yang, 2007).

While research on knowledge maps is still at an early stage, over the past few years the number of studies has continuously been increasing. There are several streams of research central to knowledge maps such as network analysis, information visualisation and text mining. Nevertheless, there has been no effort to review these studies systematically in order to make them useful for researchers and practitioners. Therefore, there is a need to synthesise the evidence regarding the accuracy and usefulness of existing studies.

Motivated by lack of work, and the use of a systematic review technique in a knowledge map area, the main objective of this study is to introduce the idea of using this technique in order to explore the world of knowledge mapping and provide a holistic overview of the current state of the art to all researchers and practitioners. The secondary objectives are to: (i) methodically collect, analyse and synthesise all existing studies within this domain in a fair and rigorous manner in order to bring the state of research themes to the practitioners and bring them up to date on the activities

that have been pursued by a knowledge map research community; (ii) reveal prospective research gaps that require further research. More specifically the following research questions were stated:

RQ1. What are the topics of knowledge maps that have been addressed?

RQ2. What are the potential benefits of knowledge maps?

RQ3. What are the different tools and techniques of knowledge maps?

RQ4. What are the different classifications of knowledge maps?

RQ5. What are the different methodologies currently known to build knowledge maps?

RQ6. What are the key challenges and barriers of knowledge maps?

RQ7. What are the limitations and gaps in the current research?

To achieve and explain effective results in a clearer and more understandable manner, this systematic review was performed by using the guidelines proposed by Kitchenham (2007). A systematic review is developed, as the terms denote, in a methodical and formal way. This means that the research procedures of a systematic review follow a strict sequence and very well defined methodological steps, according to an aprioristically developed protocol. The task here involves distinct activities: develop the research protocol, state the criteria of inclusion and exclusion studies and assess the articles’ quality based on well-defined criteria, data extraction, synthesis and analysis.

Subsequently, this review collects, synthesises and analyses 132 articles as primary studies on a variety of topics closely related to knowledge maps published from January 2000 to December 2013 in top journals and conference proceedings. The review shows that there is a growing interest in knowledge maps and that specialised tools and methodologies have recently been established, which help in creating and managing knowledge maps. On the other hand, we noted that while existing research covers a large number of studies on some disciplines, such as systems and tools development, it contains very few studies on other disciplines such as knowledge maps adoption. To aid this situation, we offer directions for future research.

Overall, through a comparative analysis of those studies, we aim to provide readers with a comprehensive understanding of the knowledge map domain. We believe that this review will be significant for researchers, who want to recognise topic areas where research is lacking or have been researched, as well as for practitioners, who want to know the state of research and stay up to

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