The Knowledge Engineering Review, Vol. 00:0, 1–24. © 2004, Cambridge University Press
DOI: 10.1017/S000000000000000 Printed in the United Kingdom

Applied Concept Mapping: Capturing, Analyzing, and Organizing Knowledge by Brian M. Moon, Robert R. Hoffman, Joseph D. Novak and Alberto J. Cañas (Editors); CRC Press, 380pp. $52, ISBN-13: 978-1439828601

MIHÁLY HÉDER

Budapest University of Technology and Economics, Department of Philosophy and History of Science
Egry Jozsef u. 1, E606 , H-1111 Budapest, Hungary
E-mail: mihaly.heder@filozofia.bme.hu

A concept map is a graphical representation that gives an answer to a "focus question". Both nodes and edges are labeled in these graphs, and the labeling and structure of the graph is governed by a set of rules. The book reports that concept maps were empirically tested and found to be useful in many different learning settings.

This book is a collection of 16 chapters, by 37 authors in total. Most of the chapters describe applications of concept mapping in solving problems in a variety of fields, like institutional memory preservation at NASA or a nuclear power plant; requirement capturing in software design; ecological management; intelligence analysis at defense departments; etc. In these chapters, one can find interesting concept maps that are used in real life.

Not all the chapters are equally scientific however. Some of the chapters contain profound benefit-drawback analyses of the application cases, while others are rather like business white papers that describe yet another product success story. The lack of reflection on possible questions and doubts is a re-occurring problem throughout the book.

For example, Chapter 2: *Skills in Applied Concept Mapping* explains that it is desirable that the labels of a concept-link-concept triple (concepts are nodes, and links are edges in a concept map) be readable as human-language propositions, but it fails to discuss how this feature is to be achieved in non-English concept maps, especially in the case of agglutinative languages. Multiple chapters explain how concept maps are used with great success in teamwork to facilitate brainstorming sessions, discussion of ideas, and knowledge sharing. However, the extent to which success is to be credited to concept mapping as a tool itself, or rather to the management practices that accompany it, is not investigated: the team-building effect of the concept mapping session, and the iterative nature of the process (also explained in Chapter 2) are similar to many other design methods. At the end of the book, in Chapter 16: *Vying for the Use of CmapTools in Corporate Training*, a concept mapping software package called CmapTools — the weapon of choice in every chapter of the book — is compared to MindManager and FreeMind, two mind mapper tools. CmapTools comes out the winner, seemingly based on the fact that it realizes exactly the requirements of its own design, while the others are doing something else this phenomenon is perfectly normal in marketing materials, but can be somewhat annoying in scientific writing.

In Chapter 2: Applying Educational Tools and Ideas in the Corporate World, the authors criticize other knowledge representation methods — they mention the ones described in Jonassen et al.'s book titled Structural Knowledge — for not having clear epistemological foundations. But this seems to be the case with the examples in this book as well: some concept maps are rather like taxonomies, others express events or instructions, while still others have causal semantics. In Chapter 13: Improving Organizational Learning with Concept Maps: a Business Case Study, it is claimed without supporting discussion that concept mapping might be a useful means of representing tacit knowledge, a striking statement if one considers that the usual example of tacit knowledge is the ability to ride a bicycle. There is a great deal of debate over whether tacit

knowledge is explicable at all — but neither side claims that explicating tacit knowledge would be as easy as implied here.

There are some cases in which the different chapters do not reflect each other. For example, in Chapter 3: *Concept Mapping in the Analysis and Design of Cognitive Systems: A Historical Review* (the chapter discusses the cognitive systems by which humans organize their work — it is not closely related to computing, as the title might suggest), there is a description of how concept maps may be extended to deal with temporal information or event sequences. However, in Chapter 6: *Using Concept Maps to Improve the Practice and Organization of Intelligence in Canada*, the lack of ability to express linear relations appears to be a problem for the authors. One might wonder whether the solution offered in Chapter 3 might be applicable here as well.

On the other hand, the aforementioned Chapter 6, by Natalia Derbentseva and David R. Mandel, gives a really profound and balanced analysis of the advantages and drawbacks of concept mapping, making this chapter stand out from the others. Derbentseva and Mandel not only demonstrate the advantages of the visual nature, the communicative potential, and the descriptive power of concept maps in complex tasks, but they also discuss some possible drawbacks. These include the fact that concept maps might have problems expressing dynamic relations, probabilities, and counterfactual relations. The method might also result in an overemphasis on the tools rather than a focus on the problem itself; furthermore, some people might simply find the method less productive than others.

While expressing many bold, yet rather unjustified claims, this book still offers a bazaar of valuable ideas to the reader on how to approach certain problems using the diagrammatic method of concept mapping. I would recommend the book to those who are already members of the concept mapper community and want to hear about other member's use cases. For the rest, I would recommend a tour on the CmapTools web site (http://cmap.ihmc.us/) first, where a nice introductory article on the theory (Joseph D. Novak and Alberto J. Cañas: *The Theory Underlying Concept Maps and How to Construct and Use Them*, 2008) and concept mapper software for free download can be found. For those who are enthused by reading the article and experimenting with the software, the next step is reading this book. It would be worth the time before starting a larger concept-mapping project, as the book's real strength is in reporting on real world applications.