Knowledge Atlas: a cartographic approach to the social structures of knowledge

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Abstract - **This poster aims to visually present the first results of the ongoing research on a cartographic approach to the representation of knowledge in its present configurations by showing some applications of the 'Knowledge Atlas', a software tool developed to explore such approach.**
The concept of 'atlas' in this context doesn't depict as much a list of maps, but rather a system of representations of space, a communication device aimed at representing complex contexts through the use of many partial overlapping narrations: a network of maps, diagrams, texts and peritexts, combined together to describe the space of research in its multifaceted aspects.

Keywords **– knowledge cartography, research management, knowledge visualization,**

I. INTRODUCTION

In a context where the modalities of creation, organization and access to information have dramatically changed, computers and networks are acquiring a dominant role in the definition of new methods for its creation and sharing. To *know*, in the digital age, means to be connected to a network (both social and technological) able to provide information and competences at the time of need.

Clearly, while a social paradigm for knowledge is being defined, the tools and methodologies for its representation are still missing. Traditional representation images such as trees of knowledge, scales and networks are hardly able to describe such complex environments.

This poster aims to visually present the first results of the ongoing research on a *cartographic approach to the representation of knowledge* in its present configurations by showing some applications of the 'Knowledge Atlas', a software tool developed to explore such approach.

II. THE ATLAS

The *Atlas of knowledge spaces* takes advantage of the experience developed by cartography in the representation of complex and open spaces, historically able to hold heterogeneous, natural and social elements together in the same picture. The concept of 'atlas' in this context doesn't depict as much a list of maps, but rather a system of representations of space, a communication device aimed at representing complex contexts through the use of many partial overlapping narrations.

From a practical point of view, the *Atlas* is a software prototype being developed by the *Communication Design Research Unit (d.com)* at the Politecnico di Milano, for the management of research systems (ie. resources, actors and relationships that interact in the creation of new knowledge), designed to support common tasks of research such as survey, mapping and analysis.

The software, built on web-based technology, presents itself as a social web-application that allows any user to build his own bio-bibliographic database four types of resources (authors, texts, projects, conferences and research groups) related to their research.

Each resource in the system can be described *collectively* by the users (as in a wiki) in its essential features (such as date, description, location,…) and *individually,* by each user, through the definition of tags, comments, and through the establishment of relationships between entities (e.g. relating a text to its author, a person to a research group).

Figure 1. Screenshot of Atlas interface.

III. KNOWLEDGE CARTOGRAPHY

This management model for the research ecosystem offers the ability to create a collective network of users, resources, and keywords. Working on these data it's possible to create an *Atlas of knowledge spaces* made of maps at various levels of scale, ranging from personal research maps to department-level maps of knowledge, or even collective maps of research areas emerging at university level.

Of course, a naive visualization of *all* the entities stored within the database would be both impossible and useless because of excessive information density. As with traditional cartography, the task of representation doesn't simply lie in the creation of a *replica* of reality, but appears as a cultural process for the narration of the territory. According to cartographic rhetoric, reality must be *selected*, *projected* and *symbolized* in order to create maps with specific objectives.

- The selection process distinguishes the elements relevant to the description of space according the map intended

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use. Depending on the author's choices, the map can choose to show only the relationships between the authors and their texts, or the relationships between researchers and their research themes, or maybe just the most popular conferences.

- The *projection* process, just like in traditional cartography, aims at placing the cartographic entities on the map space in order to create the best possible image for a specific activity. In the context of knowledge spaces, the *Atlas* currently provides four main projection modes placing entities on semantic, socio-relational, geographic and temporal spaces.

- Finally, the *symbolization* process on one hand allows to create a hierarchy of visual resources, highlighting some of them depending on the map's intended function, and the other hand it lets the author adjust the connotations related to the visual form through the definition of a representation language, a lexicon and a visual style.

Unlike traditional maps, however, users of the *Atlas* are allowed not only to intervene in the navigation of space, but also in the cartographic process. The previously introduced rhetoric operations are thus shared with the users, enabling them to create multiple visual narratives designed to perform specific actions: deepen the understanding of some issues, identify reference authors for a specific discipline, find connecting paths between two seemingly separated research areas, etc.

IV. FUTURE DEVELOPMENTS

Future developments of this research will investigate its possible application to design research, academic libraries and visual communication archives, while further exploring the cartographic metaphor.

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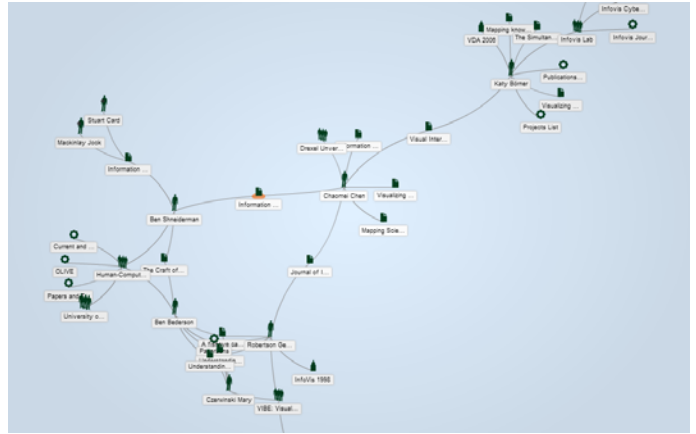[5] Wood Denis, *The Power of Maps* (New York: Guilford Press, 1992).

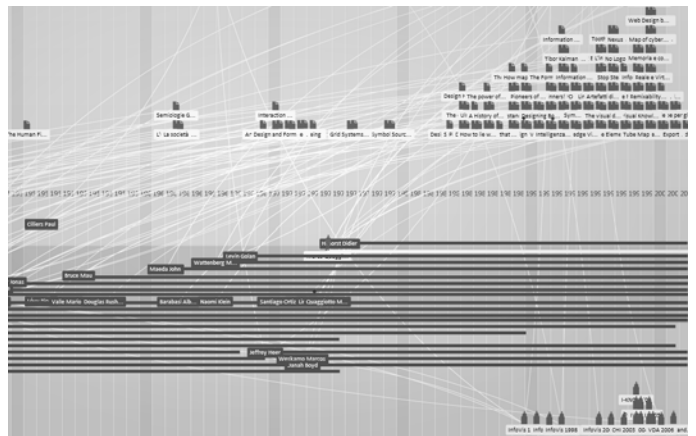**Figure 2.** Example of relational resource map.
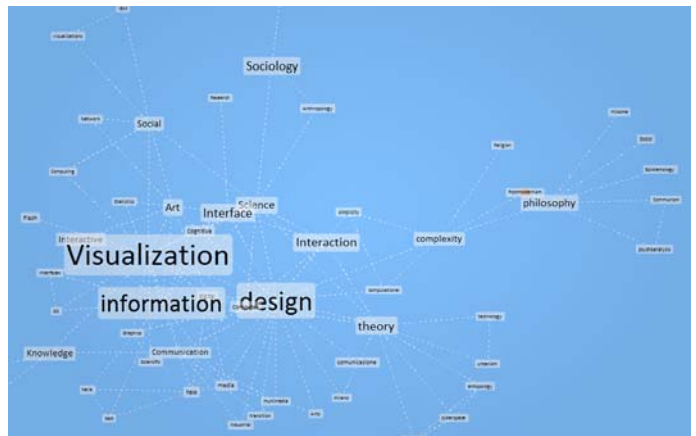

Figure 3. Example of temporal resource map.

Figure 4. Example of semantic map.

Figure 5. Example of geo-thematic map.