

# The Temporal Dimension in the Study of Knowledge Bases: Approaches to Understanding Knowledge Creation and Representation Over Time

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## ABSTRACT

The panel explores the theoretical, methodological, and design aspects of the temporal dimension in the study of knowledge creation and representation and offers insights in both the challenges and the promising future directions. The goal of the panel is to start a collaborative discussion around a number of important themes.

## Categories and Subject Descriptors

Applied computing • Document management and text processing  
• Information systems • Content analysis and feature selection •  
Information systems • Clustering and classification

## General Terms

Your general terms must be any of the following 16 designated terms: Management, Measurement, Documentation, Design, Languages.

## Keywords

Knowledge and emergence, Temporal aspects of information systems

## 1. INTRODUCTION

The way knowledge is produced, organized, and disseminated is dependent on historical, institutional, political, and research contexts. The field of information science has focused its attention on examining spaces for the production of knowledge (from labs to libraries) as well as understanding the specific time period in which the knowledge has been produced. However, there is still work to be done when it comes to understanding the dynamic nature of knowledge production and representation. To start with,

we need good understanding of how, the meanings of the concepts we use to talk about knowledge have been changing and how to manage their culturally and historically specific meanings in information systems. We also need to be able to identify emerging knowledge as something different *in kind* from what has come before – that is, what are the frontiers of concepts that need to be identified and represented? And while some work has developed to study the dynamics of knowledge production and representations, these studies have focused on linear approaches (e.g., Milojević et al., 2011). However, the processes around the knowledge production and classification are highly dynamic and often non-linear. The changes occur not only within and between different units of analysis – the individual, artifacts, concepts, groups, institutions, practices, events, and cultures, in what Aker (2007) calls ecologies of knowledge, but also across varying temporal scales – lifetimes and habits, generational concepts and practices, and cultures, which define both semiotic meanings and group affiliations (Caporeal, 2007).

This panel will explore the theoretical, methodological, and design aspects of the temporal dimension in the study of knowledge creation and representation and offer insights in both the challenges and the promising future directions.

The goal of the panel is to start a collaborative discussion around a number of important themes:

--Articulation and refinement of basic concepts related to studies of knowledge situated in temporal context(s);

-Discussing existing theories and models of temporal dimensions of knowledge creation and representation along with new potential theories and models;

-Sharing of insights regarding techniques and methods used to study temporal dimensions of knowledge creation and representation;

-Discussion of innovative approaches for triangulation in these temporal contexts.

## 2. FORMAT

The panel will provide an opportunity for the audience to engage in discussions about the future of studying knowledge creation and representation over time within information science. The panelists will provide grounding for the discussions and outline challenges that need addressing.

The topic will be introduced briefly by the moderator, Joseph T. Tennis, who will contextualize the question based on ontogenic analysis and classification scheme versioning (Tennis, 2012) and each panelist will then give a short (approximately 10 min.) presentation in which they outline their views on the current research, major challenges, emerging cutting edge research, tools, techniques and the major developments expected in the near future. We will then open up the floor for audience participation.

Specific topics will be discussed by individual panelists. In the panelists' voices we will hear these topics:

Staša Milojević - Cognitive studies of science focus on science as a body of knowledge, i.e., ideas and relationships between ideas. Given the importance of textual documents in the practice of science (Callon et al, 1983; Latour & Woolgar, 1986) it is natural to focus on the shared conceptual systems of scientific communities as expressed through the terminology used in those documents. Staša will describe some of the methods she has developed for the quantitative history of concept formation and development. She has been focusing on analyzing words derived from document titles as a promising approach to examine the standardization of field vocabulary, diffusion of concepts, and cognitive extent of different scientific fields and disciplines.

Melissa Adler -Taxonomic discourses for sexual practices and identities are constantly changing, expanding, reappropriating, offending, and refusing to be pinned down, presenting a challenge for classification systems which strive to describe their objects in stable, contemporary terms. LCSH, LCC and the Library of Congress catalog are sites where present-day authorized terms are used to facilitate the retrieval of works published over the course of history. Borrowing from J. Halberstam's notion of "perverse presentism," Melissa will describe how current terms and classifications for gender and sexuality can oversimplify, complicate, and distort the historical record, potentially leading to a perversion of meaning and inaccurately rendering certain acts and identities perverted.

Seth van Hoolland - The evaluation of the quality of information systems is traditionally based on the assumption that it is possible to detect a formal error within an information system by comparing the content of the database with the reality the system strives to represent. However, this thinking makes abstraction of the fact that for empirical data, which are subject to human interpretation, theories change over time along with the interpretation of the values that it has made it possible to determine. Here hermeneutics offer a valuable tool to interpret individual empirical events by placing these singular events, which occur at a specific moment in time in a more abstract and generalizing framework. This framework is typically created through a continuous process of going back and forth between the individual observations and the larger context in which the observations can be framed.

Corinne Rogers - Information management is often framed in terms of risk management, and as such it operates in an assumed temporal dimension. For businesses juggling issues of security, performance, and stakeholder relations, risk assessment and risk management are critical. However, information management can be considered from another perspective – that of information ethics. How can we design our information systems – the complex of hardware, software, user application and expectations – to account for and address issues of information ethics? These issues are bound up with trust – trust in the system over time, and trust in the digital objects created by and with the components of the system. We can focus on one aspect of trust – that is, authenticity. Authenticity is an expectation of both the creator and the user. In digital systems, authenticity of digital objects is assessed through metadata at the point of creation and over time. What are the unconscious temporal biases embedded in the metadata we capture within the information system, and how does this impact ethical questions of integrity and identity?

Jevin D. West - Few times in history have been better for studying knowledge organization. (1) The data is readily available, clean and temporally deep, especially when using the scholarly literature as a testbed. (2) Network analytics has grown to a mature field, and its models, algorithms and visualizations are proving their worth in areas of research that look at the formation fields of scholarship. And (3) computation resources allow researchers to study these systems at scales unheard of even just one decade ago. In words, the opportunity is ripe for studying how knowledge is organized and how this organization changes over time. What questions can be pursued today that couldn't be pursued yesterday? What are the practical implications of these new tools and data sets for studying knowledge organization? How do these systems change over time and what are the challenges for studying these knowledge networks over time?

After the panelists have given their presentations, Tennis will synthesize the contributions into points along a research front, and the pose some open questions. The audience will be encouraged to engage with the panel and each other about the topic. The moderator will facilitate the discussion and the issues raised by the panelists will be used as the springboard for the discussion. This format should capitalize on the diverse expertise of the panel and stimulate interactivity.

## 3. PANELISTS AND MODERATOR

Melissa Adler is an Assistant Professor in the School of Library and Information Science at the University of Kentucky. She earned her Ph.D. in Library and Information Studies, with a Ph.D. minor in Gender and Women's Studies in 2012 from the University of Wisconsin-Madison. Her research investigates processes of disciplining and resistance in classifications and names, and the roles of such practices in knowledge production.

Staša Milojević is an Assistant Professor in the School of Informatics and Computing, Department of Information and Library Science, Indiana University, Bloomington. Her research focuses on quantitative history and sociology of science. In large-scale longitudinal studies of the development of modern scientific fields or disciplines she combines models, theories, and methods from information science, science and technology studies, and social network analysis.

Corinne Rogers is a doctoral candidate and sessional lecturer in the School of Library, Archival, and Information Studies at the University of British Columbia. She teaches digital diplomacy and digital records forensics, and her doctoral research investigates concepts of authenticity of digital records, documents, and data, and the assessment of authenticity of digital documentary evidence in the legal system.

Joseph T. Tennis is an Associate Professor at the Information School of the University of Washington and an Associate Member of the Peter Wall Institute for Advanced Study at The University of British Columbia. He has been an occasional visiting scholar at the State University of São Paulo since 2009. He is Reviews Editor for *Knowledge Organization*, Managing Editor for *Advances in Classification Research Online*, and on the editorial board for *Library Quarterly* and *Scire*. He holds a Ph.D. in Information Science from the University of Washington. He works in classification theory, scheme versioning, and comparative studies of metadata.

Seth van Hooland holds the chair in Digital Information at the Information and Communication Science department of the Université Libre de Bruxelles (ULB), Belgium. Within the current move towards a more structured and semantic environment for electronic resources, van Hooland wants to bridge the gap between domains (Document and Records Management, Open and Linked Data, Digital Humanities), practices (manual and automated metadata creation, data cleaning and enrichment) and communities (academia, industry, activists and practitioners) in order to make resources as accessible as possible in a sustainable manner.

Jevin D. West is an Assistant Professor at the Information School at the University of Washington. He builds models, algorithms and interactive visualizations for improving scholarly communication and for understanding the flow of information in

large knowledge networks. Jevin co-founded Eigenfactor.org — a free website and research platform that librarians, administrators, publishers and researchers use to map science and identify influential journals, papers and scholars. His research has been featured in *The Chronicle of Higher Education*, *Nature* and *Science*. Some of his most recent research involves recommendation, auto-classification, and patent valuation.

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