Implementing New Knowledge Environments: Laying Research Foundations for Understanding Books and Reading in the Digital Age

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Abstract. In this paper, we present the first year work of the INKE (Implementing New Knowledge Environments) research group, a large international, interdisciplinary research team studying reading and texts, both digital and printed. The INKE team is comprised of researchers and stakeholders at the forefronts of fields relating to textual studies, user experience, interface design, and information management. We aim to contribute to the development of new digital information and knowledge environments that build on past textual practices. We discuss our research questions, methods, aims and research objectives, the rationale behind our work and its expected significance – specifically as it pertains to our first year goals of laying a research foundation for this endeavour. We thank the Social Sciences and Humanities Research Council of Canada (SSHRC) for funding a research cluster grant, which has made our research network possible, and the generous co-sponsorship of our institutions and research partners.

Categories and Subject Descriptors: H. Information Systems; H.5 INFORMATION INTERFACES AND PRESENTATION (e.g., HCI) (I.7); H.5.2 User Interfaces (D.2.2, H.1.2, I.3.6); H.1.2 User/Machine Systems; Human information processing

General Terms: Design, Human Factors, Theory

Keywords: Text, Interface, Prototype, Reading, Book

1. Introduction

This paper presents an overview of the first year, foundational work of the INKE (Implementing New Knowledge Environments) research group, a large international, interdisciplinary research team, including 35 from 20 different institutions. We have come together to study different elements of reading and texts, both digital and printed. It follows the project overview presented at the BookOnline'08 workshop in Napa (Warwick, et al.), which discusses our larger mandate; discussion of our long term research objectives are available in Siemens, et al. (INKE 2009; forthcoming).

We aim to contribute to the development of new digital information/knowledge environments that build on past textual practices, having already articulated a foundation for identifying the characteristics of digital interfaces that respond to the expectations and needs of a broad constituency of professional, personal, and lay readers. Ultimately, our work provides functional reading interface prototypes that have the potential to transform the way we engage with the digital materials that comprise our personal and professional reading.

2. Research Foundations: Year 1 in Context

In the context of our larger research goals, first year concerns are foundational for us, in which we lay theoretical, methodological, conceptual and infrastructural groundwork necessary for building prototypes in the subsequent phases of our work.

2.1 Textual Studies (TS): Documenting Architectures of the Book

To understand how digital textuality will affect practices associated with the engagement of materials in new media, TS documents the features of past textual forms and practices to provide the vocabulary and theoretical framework for implementing new knowledge environments. TS brings several approaches to bear upon all manner of human artifacts, digital and analog: *book history*'s interest in books as primary mediators of human relationships (Johns), and in the book as "the text" on a human scale; *bibliography*'s focus on print material as physical, machine-produced vehicles of abstract texts (Greetham); and *literary theory*'s sensitivity to the complexities of form, content, and materiality in all linguistic mediation (McGann).

The TS team's primary contribution to INKE will be to document the essential features of historical textual forms and their associated human practices, which will provide the essential vocabulary and theoretical framework for the other teams' re-conceptualizing of the book. For INKE's prototyping cycles to be grounded in the histories and imaginable futures of human reading practices, the project will need a knowledge base bridging book history and information architecture. As a necessary complement to INKE's core activity of *prototyping*, we will need an ongoing *modeling* process that informs INKE's work at the levels of theory, history, and code.

As their primary activity in year 1, TS will establish a textual features knowledge-base which we have tentatively titled *Architectures of the Book* (or *ArchBook*), which provides a history of textual production. This online resource will not only be the most comprehensive online reference for the history of the book, but will also promote research on the future of the book through its focus on the information architecture of texts. It will act as a resource for all members of our team and, further, will be available to all those working in areas it touches on.

2.2 User Experience (UX): User Requirements Gathering

UX studies the complex process of engaging with materials in print and digital environments, deriving requirements for and testing, prototypes developed by the research team. UX conducts studies with individuals engaging with humanities artifacts in a variety of contexts. These artifacts may include different types of content: text, sound or images; they may be complex in structure, and may contain annotations. Each of these variables may modify cognitive and affective response. (Unz). Humanists read in different ways depending on the formal properties of the text and the object of the reading enterprise (Grafton). They are also affected by feelings about physical environments (Rimmer, et al). Any study of individuals engaging with such materials should therefore take into account the complexity of the enterprise and employ multiple methodologies.

UX will survey current literature on reading, HCI and user behavior and develop and implement user requirement studies. Participants in studies will include attendees at the Digital Humanities Summer Institute (June 2009; www.dhsi.org), humanities and social sciences researchers (faculty and students: undergraduate, graduate, and postgraduate), adult readers of literary fiction and online information sources, and secondary school students. At UCL, studies will be ethnographic in nature, following a use-in-context approach, and will examine broadly how humanities scholars approach research (what resources they use, etc). At UBC, user requirements studies will focus on use of particular genres of information specific to the INKE project (e.g., scholarly editions, journals and monographs, e-literature), devices, and humanities research tools.

2.3 Interface Design (ID): Modeling 'Chaining' in Professional Reading Practice

Given the emerging possibilities offered by new media, it still remains to understand and develop methods and models to: (1) extend reader control of digital texts; (2) address issues raised by the printed page metaphor, and give readers and researchers better control of their activities by: revisiting the notion of page boundaries; enhancing the scrollbar; designing advanced means of bookmarking and annotating; implementing new digital metaphors that may derive, for instance, from sculpture or visualization rather than from the codex book; and exploring possibilities for parallel displays and related tools; (3) merge reading culture with prototypes of social software; and (4) rethink and re-present genres of print material as well as examine some of the emerging born-digital genres. Theoretical models for representing digital textual material are in their early stages and do not fully accommodate the visual and logical dimensions of texts, tending instead to emphasize structure over the integration of visual information provided by typography and illustration, and ignoring the fact that the disposition of text and the layout of the text may help reading and visual memory, as one's ability to retrieve information depends in large part on spatial cues consistent from one act of reading to another. New media provide opportunities to develop methods and models that rethink conventions of print material and examine born-digital genres, such as e-literature, and also to consider how reading culture is affected by the rise of 'social' computing.

ID's focus for year 1 is on studying the interrelations between research papers published by different disciplines, largely through the act of 'chaining' citation structures on existing bodies of work, and to design an application that appropriately tracks and models this behaviour. Called the "Paper Drill," the origin of this concept

is in UX team research into the reading practices of academics who follow citations as part of their professional reading. The functional goal is to allow a user to choose a representative paper in a field they don't know very well, then have the system find the citations in that paper, collect those papers, find the citations in them, and so on down to the third level, then produce a report that lists the most commonly cited papers in the set – thus providing a snapshot of an area from the perspective of the seed paper.

2.4 Information Management (IM): Developing Test-bed Corpora, Data-stores, and Analytical Facilitators

IM research seeks to find pragmatic solutions and optimal combinations of the best of several knowledge management strategies for the INKE team's work: the speed and power of the search engine; deep textual-analysis methods used by the scholarly community; consistently encoded corpora in specific knowledge domains; and detailed user-recorded results provided by the social networking. Toward the goal of provide ways to organize and access the expanding and diversely formatted body of digital material in ways that best serve the needs of users, IM's goal is to develop the informational underpinnings for four prototypical digital reading environments. IM's year 1 goals are toward investigating and test-bed implementing corpus technologies necessary to build primary and secondary corpora pertinent to our reading environments, in English and French, through our research partnerships and stakeholder networks. This begins with a literature / technology review, surveying current state of *corpus* building (including establishment, facilitation, and [semi]automatic generation), *stores* (including building collections, databases for digital documents, and knowledge management systems), *analytical facilitators*, and *API* issues; it culminates in the development of test-beds combining corpora (primary and secondary materials) in stores and analytical facilitators in the team's test-bed areas of the scholarly edition, the academic monograph, poetry and creative fiction, the scholarly journal and essay collection.

2.5 Team Administration and Research Management

As will be the case in years 2 – 7, year 1 has on focused, integrated, and coordinated activity among all researchers and research partners, manifest in outcomes pertaining to specific disciplinary areas as well as an interdisciplinary fusion of the team as a whole, and the application of our work to the production enterprises of our partners. To ensure this, we have focused explicitly on understanding, creating, and evaluating research structures that will allow academic and non-academic research team members to work together in ways that meet the needs of the research and development cycles of the entire INKE group. We have put into place an integrated and detailed research plan and a documented internal governance and reporting structure that, together, outline a working relationship and processes that allow us to work toward common goals.
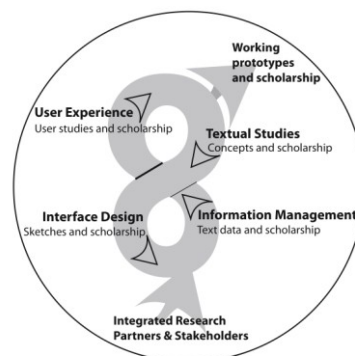
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