This is an author version. The final version to appear in INTERACT 2011: Workshop Proceedings of 13th IFIP TC13 Conference on Human-Computer Interaction, acm In-Cooperation, SpringerLink, Sep 2011

Interactive Reading: Serendipity in the Context of the Blended Library

Roman Rädle[1], Mathias Heilig[1], Harald Reiterer[1]
Human-Computer Interaction Group, University of Konstanz, Universitätsstraße 10, 78457 Konstanz, Germany
{Roman.Raedle, Mathias.Heilig, Harald.Reiterer}@uni-konstanz.de

Abstract. In this paper we state our interest in the workshop themes according to the three categories understanding, designing, and evaluation. In addition, we give a short introduction into our research project Blended Library and describe the idea of an *"Interactive Reading"* environment that aims toward "*encouraging serendipity in interactive systems"*.

1 Interest in Workshop Themes and Serendipity-Related Topics

By means of the project Blended Library[1], we are exploring interactive environments supporting serendipitous discovery. The project aims at blending [1] the two domains of physical and digital libraries to create an environment that comprises the advantages of both worlds (e.g. skimming through physical books and editing digital artifacts [2]). Furthermore, we are aware that understanding and evaluating interactive systems that aim for encouraging serendipitous discovery also play an important role for their success. Therefore, we are currently developing a "living lab" [3] within the library of the University of Konstanz. This environment will be used to implement and evaluate novel user interface and interaction concepts under realistic conditions. Especially, the evaluation of such interactive systems can help to improve user experience and lead to a better understanding of serendipity and thus a better design of serendipity supportive and interactive systems.

2 Research Question

By time of writing this article, it is still cumbersome to transform physically annotated documents into the digital world (e.g. scan pages of a document). At the same time, browsing along cited articles to find relevant information is an awkward task when using printed paper documents. With new interaction and display

[1] http://hci.uni-konstanz.de/blendedlibrary. The project is funded by the Ministerium für Wissenschaft, Forschung und Kunst, Baden-Württemberg (MWK), Germany.

technology such as mid-air gestures, multi-touch, digital pen & paper, augmented reality, wall-sized displays, or (ultra-)mobile devices we want to minimize the gap between the physical and digital worlds and enrich user experience in sense-making processes. We are especially concerned with the research question: *How can emerging technology facilitate knowledge workers in collecting and sense-making of data gained through serendipity supportive environments?*

5 An Environment for Interactive Reading

In the following section we will introduce an idea called *"Interactive Reading"* that facilitates the process of reading through an ambient display (Fig. 1 shows a sketch). Moreover, it supports both e-book devices as well as paper printed media. Although this concept is described in the context of our Blended Library it also applies to other scenarios where reading and reading comprehension forms a dominant factor.

Fig. 1. This sketch illustrates the idea of the *"Interactive Reading"*. It supplies the user with additional information on a secondary wall-sized display while reading a document on an e-book device.

The process of understanding a research paper relies to an essential extent on sense-making. For instance, making relations to other work or linking it to information gathered previously. If such functionality or information is not instantly available, the gap needs to be bridged by the knowledge worker (e.g. search and browse in the web). However, access to external resources interrupts the reader from his main task – reading – especially if reading comprehension is regarded as an essential task, which is performed better if it is done with no distraction [4].

Therefore, our concept of *"Interactive Reading"* supports knowledge workers with in-depth details on a document and information related to it by offering these contents

on an additional wall-sized display. This holistic environment is equipped with a comfortable reading chair to allow readers to immerse in the reading process. In addition, the environment recognizes the current page of a document and searches implicitly for related information, while the user continues reading. This information is, then, displayed dynamically and unobtrusively on the ambient display. A study from André et al. (2009) has shown that *"personalization scores correlate with both relevance and also with interestingness, suggesting that information about personal interests and behaviour may be used to support serendipity"* [5]. Therefore, we also think this display may encourage the knowledge worker to explore the personalized information space on demand and to offer the chance for serendipitous discoveries.

The main point of our idea is to present the ambient information on the peripheral display in an unobtrusive manner so that the reader is not distracted from reading. For instance, content fades-in if the reader glances for a certain time (e.g. time threshold) on the ambient display and otherwise it fades-out to able immersive reading. Thereby, the knowledge worker gains an added value by browsing through the contents of that space if a document lacks information or different sources are desired to verify a conclusion. In order to grasp the contents directly, the knowledge worker can use mid-air gestures or multi-touch interaction to select, navigate, or manipulate the ambient information space. We could also think of additional speech input to search and browse for user intended information and thus provide the opportunity to use distinct input modalities.

In conclusion, static content such as text and illustration can be enriched with multimedia content, e.g. results from web search-engines, personal information spaces, visualizations of authoring networks, or twitter feeds to a document related topic. Thus, the reader is supplied with additional information sources to actuate his imagination. This raises new research challenges regarding information visualization, information retrieval and human-computer interaction and we think that our vision of the Blended Library will benefit from this workshop in all of the three categories. In the future we seek to implement an *"Interactive Reading"* environment in our living lab and conduct user studies that determine to what extent serendipitous discovery supports knowledge workers in the process of sense-making. Therefore, we are sure that our work will greatly benefit from this workshop.

References

1. Imaz, M., Benyon, D.: Designing with Blends: Conceptual Foundations of Human-Computer Interaction and Software Engineering. The MIT Press, Boston (2007).
2. Sellen, A., Harper, R.: The Myth of the Paperless Office. The MIT Press, Boston (2003).
3. Følstad, A.: Living labs for innovation and development of information and communication technology: a literature review. The Electronic Journal for Virtual Organizations and Networks, Volume 10, "Special Issue on Living Labs", (2008).
4. Furnham, A., Gunter, B., Peterson, E.: Television Distraction and the Performance of Introverts and Extroverts. Applied Cognitive Psychology, 8: 705–711. doi: 10.1002/acp.2350080708
5. André, P., Teevan, J., Dumais, S.: From X-Rays to Silly Putty via Uranus: Serendipity and its Role in Web Search. In: 27th International Conference on Human Factors in Computing Systems, pp. 2033--2036. ACM, New York (2009)