

Context Modeling for Web Information Systems^{*}

Roland Kaschek¹, Klaus-Dieter Schewe¹, Bernhard Thalheim²

¹ Massey University, Department of Information Systems
Private Bag 11 222, Palmerston North, New Zealand
[r.h.kaschek|k.d.schewe]@massey.ac.nz

² BTU Cottbus, Department of Computer Science
Universitätsplatz 1, 03044 Cottbus, Germany
thalheim@informatik.tu-cottbus.de

Abstract. Context modeling shall lead to better aid customers in achieving intents that evolve throughout a session. A static approach to it has been proposed. This approach is not satisfactory. We adapt Theodorakis' et al. model of contextual information bases to address context modeling.

1 Introduction

One of the classical definitions of information systems (IS) conceptualized IS as media for recording, storing, disseminating linguistic expressions, as well as deriving such expressions from given ones, for more detail see [9].

Thus IS can be understood as communication systems establishing a customer-expert communication. IS help overcoming natural communication limitations. More economic models of knowledge or ability production and realization can be implemented. Consistently responding to a customer inquiry requires the IS to contain a representation of a customer model.

Context modeling refers to this customer model and focuses on the *usage*, i.e., the history of the customer interacting with the IS. Other kinds of context covering gender, age, cultural background, or the history of physical venues at which the interaction took place are not explicitly considered here.

2 Related Work

More or less following [2] the papers [3, 4, 8, 11, 14] address IS development as involving *content*, *navigation*, and *presentation*. This leads to

^{*} The research reported in this article is supported by the Massey University Academy of Business Research Fund (Project "Story boarding for web-based services", 2002/03).

respectively databases, hypertext structures, and Web page structure being considered important. Usage therefore tends to be neglected.

Co-design was introduced in [13, 12]. It conceptualizes WIS according to an abstraction layer model. Its layers are: *strategic layer*, *business layer*, *conceptual layer*, *presentation layer*, and *implementation layer*. These respectively are intended to remind at dealing with purpose, usage, content and functionality, access channels, and the actual implementation. More detail on methodological aspects of co-design can be found in [5, 12], the semantic foundation of it was introduced in [7]. Application experience concerning co-design is reported in [6, 17].

In [18, 6] respectively the term “localization abstraction” and “escort information” has been used to address context modeling. A approach to context modeling not considering usage was proposed by [7]. We adapt the work on contextual information bases (cib) in [1, 15, 16] to approach context modeling. Roughly speaking, a cib-context of an object is a name together with an optional reference to another cib-context such that both the name and the reference depend on the usage.

Referring back to [10] we use the metaphor of information space that an information system creates. This space consists of locations at which information objects are located and connections between locations. Customers can navigate through this space, locate data and functionality, invoke functionality, filter, reorder, reshape, and export or import data from or to other information spaces. Furthermore users may enter or leave information spaces.

In contrast to IS Web information systems (WIS) are open systems, i.e., virtually everyone can start interacting with them. Due to this wide variety of potential customers WIS need to have a customer model explicitly represented in them such that aid can be given can be offered to customers that get stuck while using the WIS.

3 Context

According to the Langenscheidt-Longman Dictionary of Contemporary English we understand the context of something as ‘the situation, events, or information that are related ...’ to this particular something ‘... and, that help you to understand it better.’ Based on [1, 15, 16] we associate to each location in information space visited by a customer the location the very customer visited before together with record of the dialogue at this location. This allows to display the usage or a view on it to the customer. Such view $V(T, L, U)$ on the usage being most suitable to a customer

depends on the customer type T , the location L at which the view is to be displayed and the usage U that lead to the customer being located in L . Content and functionality being contained in this view based on respective analysis should be agreed upon by developers and customers.

Associating to a location L in a static way a location as the context of L leads to different usages potentially existing that have the same context. Thus such static approach to context modeling is insufficient.

References

1. M. Akaishi, N. Spyrtos, Y. Tanaka. A Component-Based Application Framework for Context-Driven Information Access. In H. Kangassalo et al. (Eds.). *Information Modelling and Knowledge Bases XIII*: 254-265. IOS Press 2002.
2. P. Atzeni, A. Gupta, S. Sarawagi. Design and Maintenance of Data-Intensive Web-Sites. *Proc. EDBT '98*: 436-450. Springer LNCS 1377, Berlin 1998.
3. L. Baresi, F. Garzotto, P. Paolini. From web sites to web applications: New issues for conceptual modeling. *ER Workshops 2000*: 89-100. Springer LNCS 1921, Berlin 2000.
4. A. Bonifati, S. Ceri, P. Fraternali, A. Maurino. Building multi-device, content-centric applications using WebML and the W3I3 tool suite. *ER Workshops 2000*: 64-75. Springer LNCS 1921, Berlin 2000.
5. A. Düsterhöft, B. Thalheim. *SiteLang: Conceptual Modeling of Internet Sites*. In H.S. Kunii et al. (Eds.). *Conceptual Modeling – ER 2001*: 179-192. Springer LNCS vol. 2224, Berlin 2001.
6. T. Feyer, K.-D. Schewe, B. Thalheim. Conceptual Modelling and Development of Information Services. in T.W. Ling, S. Ram (Eds.). *Conceptual Modeling – ER '98*: 7-20. Springer LNCS 1507, Berlin 1998.
7. T. Feyer, O. Kao, K.-D. Schewe, B. Thalheim. Design of Data-Intensive Web-Based Information Services. In *Proc. 1st International Conference on Web Information Systems Engineering*. Hong Kong (China). IEEE 2000.
8. F. Garzotto, P. Paolini, D. Schwabe. HDM - A model-based approach to hypertext application design. *ACM ToIS* vol. 11(1): 1-26, 1993.
9. R. Hirschheim, H. Klein, K. Lyytinen. Information systems development and data modeling: conceptual and philosophical foundations. Cambridge University Press. 1995.
10. H.C. Mayr, P.C. Lockemann, M. Bever. A Framework for Application Systems Engineering. *Information Systems* vol. 10(1): 97 - 111, 1985.

11. G. Rossi, D. Schwabe, F. Lyardet. Web Application Models are more than Conceptual Models. In P.P. Chen et al. (Eds.). *Advances in Conceptual Modeling*: 239-252. Springer LNCS 1727, Berlin 1999.
12. K.-D. Schewe, B. Thalheim. Modeling Interaction and Media Objects. In E. Métais (Ed.). *Proc. 5th Int. Conf. on Applications of Natural Language to Information Systems*: 313-324. Springer LNCS 1959, Berlin 2001.
13. K.-D. Schewe, B. Thalheim. *Conceptual Modelling of Internet Sites*. Tutorial Notes. ER'2000.
14. D. Schwabe, G. Rossi. An Object Oriented Approach to Web-Based Application Design. *TAPOS* vol. 4(4): 207-225. 1998.
15. M. Teodorakis, A. Analyti, P. Constantopoulos, N. Spyratos. Context in Information Bases. *Proc. CoopIS '98*: 260-270.
16. M. Teodorakis, A. Analyti, P. Constantopoulos, N. Spyratos. Querying Contextualized Information Bases. *Proc. ICT & P '99*. Plovdiv (Bulgaria) 1999.
17. B. Thalheim. Development of database-backed information services for CottbusNet. Report CS-20-97, BTU Cottbus 1997.
18. C. Wallace, C. Matthews. Communication: Key to Success on the Web. *Proc. eCoMo 2002*. Springer LNCS.