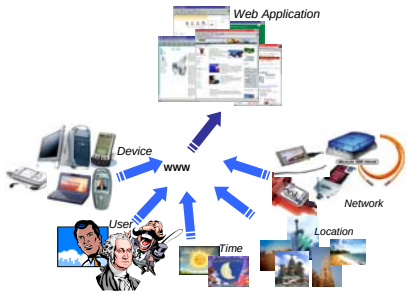
Applying Aspect-Orientation to the Model-Driven Development of Ubiquitous Web Applications

Motivation

- Facing a **new generation of ubiquitous Web applications (UWA)** due to the emergence of new access channels to the Internet
- Characterized by the **anytime/anywhere/anymedia** paradigm
- Services provided **need to be adapted to a certain context**
- **Customization** denotes the mapping of the context to the necessary adaptation
- One **major challenge**: **model-driven development** in order to counteract an ad-hoc, non-systematic, tool- and technology-driven approach
- Although some approaches for traditional Web applications exist, **dealing with the ubiquitous nature** of Web applications is **still in its infancy**

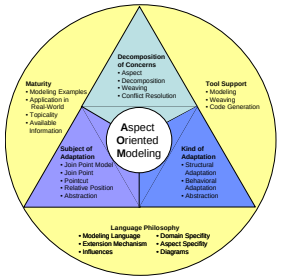
Ubiquitous Access to Web Application



Methodology

- Investigation of the state-of-the-art through **structured evaluation frameworks**
- **Re-use** of common concepts **through abstracting** them to a higher-level reference architecture
- Definition of an aspect-oriented modeling (AOM) language **on basis of a standard modeling language**
- Application to **well-established Web modeling language**
- Evaluation of the proposed approach through a **case study** with domain experts

Evaluation Framework for Aspect-Oriented Modeling



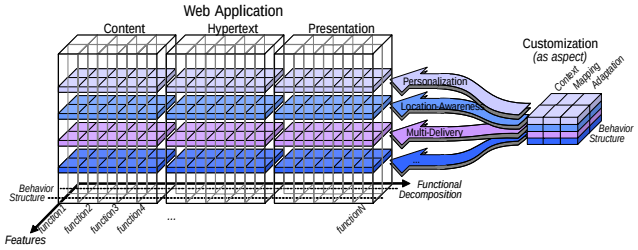
References

- Baumeister, Knapp, Koch, Zhang. Modelling Adaptivity with Aspects. Conf. on Web Engineering (ICWE05), Sydney, Australia, July 2005.
- Zhang, Baumeister, Koch, Knapp. Aspect-Oriented Modeling of Access Control in Web Applications. Workshop on Aspect Oriented Modeling (AOM), Chicago, USA, March 2005.
- Schauerhuber, Schwinger, Retschitzegger, Wimmer. Towards a Common Reference Architecture for Aspect-Oriented Modeling. Workshop on Aspect Oriented Modeling (AOM), Bonn, Germany, March 2006.
- Schauerhuber, Schwinger, Retschitzegger, Wimmer. A Survey on Aspect-Oriented Modeling Approaches. Technical Report, Vienna University of Technology, January 2006.

Problem

- Limited customization since focus is often on isolated context only and adaptation **does not comprehensively support customization**
- **Intermingled representation of customization** in current development methodologies meaning that neither a context model nor adaptation operations are modeled in an explicit, self-contained and extensible way
- **Disregarded crosscutting nature** influencing the two orthogonal dimensions of a Web application, namely *structure and behavior* for each Web application's *levels*, i.e., content, hypertext and presentation

Aspect-Oriented Approach for Customizing Web Applications

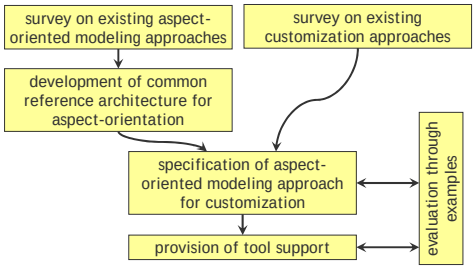


Goal

Investigation of the applicability of aspect-orientation and **proposal of an aspect-oriented approach for modeling customization** in the realm of ubiquitous Web Applications

- *Identification of the requirements* for comprehensively covering customization
- Contribution to a *common understanding of aspect-orientation*
- *Identification of the potential* of existing aspect-oriented modeling approaches
- *Proposal of an aspect-oriented modeling approach* for UWAs
- *Evaluation of applicability*
- Provision of *tool support*

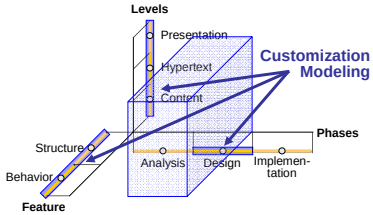
Workplan



Hypothesis

- **Aspect-orientation** has been proven as a **promising mechanism** providing a new way of modularization by clearly separating crosscutting concerns
- If **applied to customization modeling, aspect-orientation** prevents an intermingled representation by particularly taking into account customization's crosscutting nature

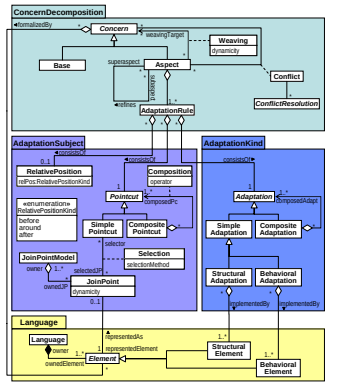
Dimensions of Aspect-Oriented Customization Modeling



Closely Related Work

- While the **majority of** aspect-oriented modeling (AOM) **approaches** is **designed as general-purpose languages** with respect to the application domain Baumeister et al. / Zhang et al. propose an approach specific to the Web application domain **specializing in the Access Control aspect and Adaptive Navigation Aspect**

Common Reference Architecture for Aspect-Oriented Modeling



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