Knowledge and Context-Based Strategies for 3D Video Content Adaptation Decision

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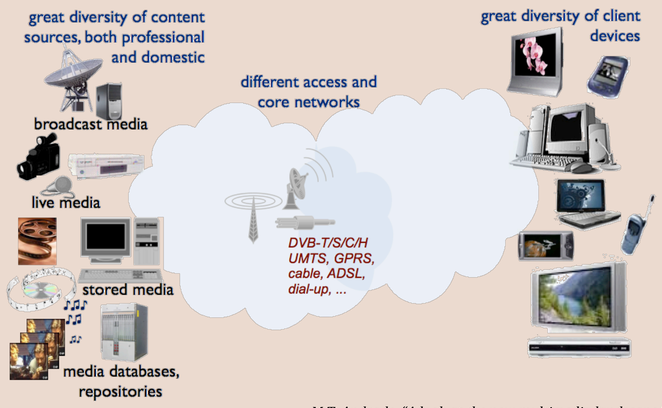
Scenario Description



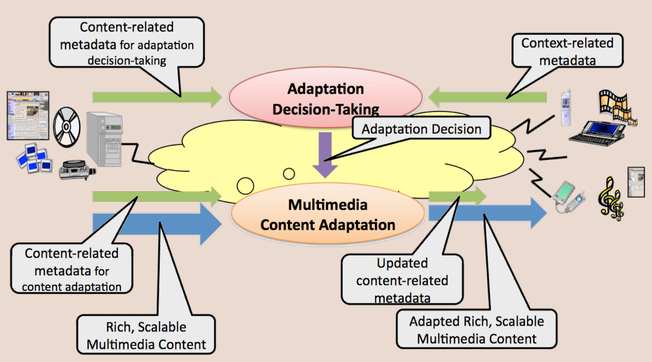
M.T. Andrade, "A look at the new multimedia landscape," 2009.

Adaptation Decision Evolution

- No metadata;
- Metadata without data association;
- Metadata with data association.

☞ Still poor results.

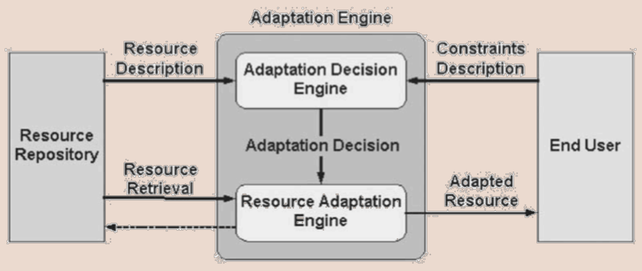
Simplified Framework for Multimedia Adaptation



Adapted from C. Timmerer, "Multimedia Content Adaptation for Universal Access," May. 2008.

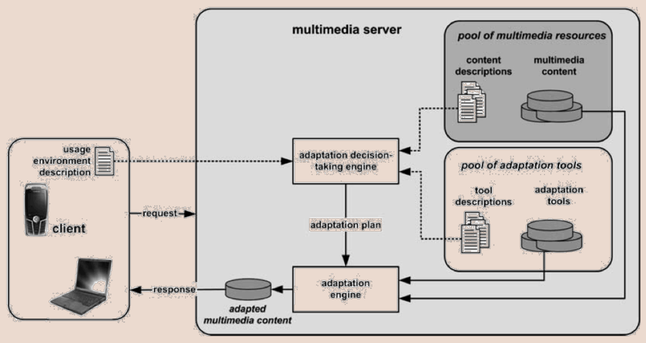
Different State of the Art Architectures

Static look-up



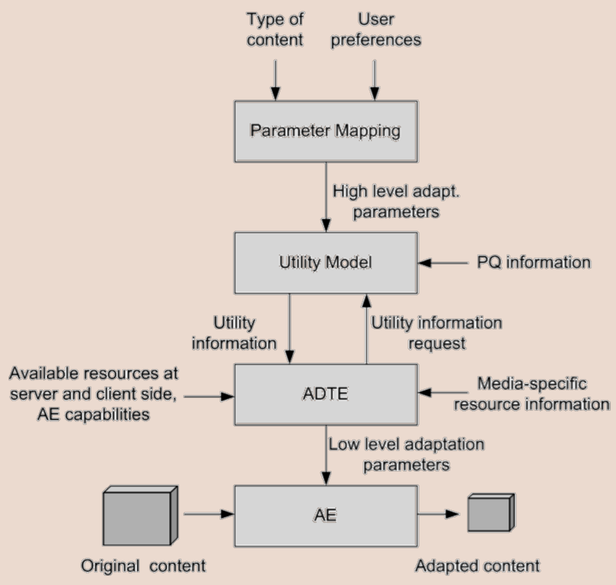
G. Panis, A. Hutter, J. Heuer, H. Hellwagner, H. Kosch, C. Timmerer, S. Devillers, and M. Amielh, "Bitstream syntax description: a tool for multimedia resource adaptation within MPEG-21," SIGNAL PROCESSING-IMAGE COMMUNICATION, vol. 18, Sep. 2003, pp. 721-747.

Knowledge-Based



D. Jannach, K. Leopold, C. Timmerer, and H. Hellwagner, "A knowledge-based framework for multimedia adaptation," Applied Intelligence, vol. 24, Apr. 2006, pp. 109-125.

Utility Based



M. Prangl, T. Szkaliczki, and H. Hellwagner, "A Framework for Utility-Based Multimedia Adaptation," *Circuits and Systems for Video Technology, IEEE Transactions on*, vol. 17, 2007, pp. 719-728.

Optimization Approach:

- Multimedia Content Characteristics;
- Adaptation Parameters;
- Context Properties.

☞ Optimization Variables.

- Dependencies Between Variables.

☞ Optimization Restrictions.

- Choosing amongst the feasible adaptation operations.

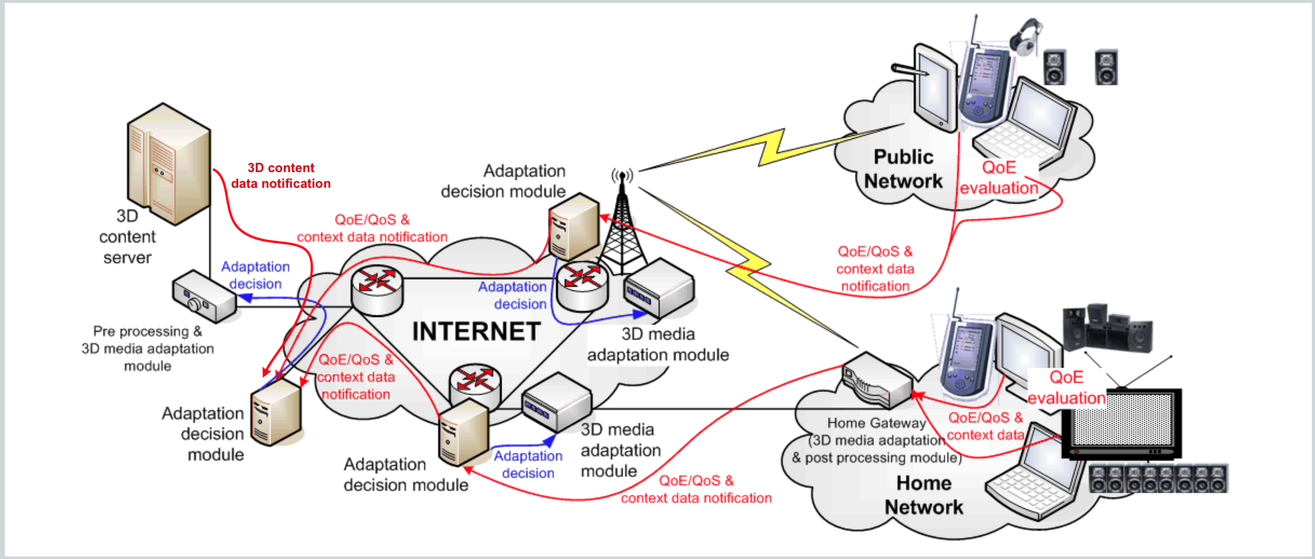
☞ Objective function(s).

D. Mukherjee, E. Delfosse, J.-G. Kim, and Y. Wang, "Optimal adaptation decision-taking for terminal and network quality-of-service," Multimedia, IEEE Transactions on, vol. 7, 2005, pp. 454-462.

3D Content Adaptation

Research area: Context-awareness and 3D content adaptation decision	
Limitations in the state-of-the-art	**Progress beyond the state-of-the-art**
Current context-aware systems in multimedia applications use mainly location information and limited device capabilities. They do not rely on standards for the representation of context and do not take into consideration the user feedback, in terms of user choice.	Use of an enlarged number of contextual descriptors, represented using standard specifications and including the user dimension. Not only will the decision mechanisms take into consideration user preferences and user characteristics, but the decision process will also be influenced by the feedback coming from the user concerning the perceived quality. The user will thus play a major role within the context-aware adaptation decision, and the system will have the opportunity to correct previous actions that did not meet the user's expectations or even initiate actions based on user feedback.
Standards are not customised to the requirements of different application areas.	Definition of a profiling approach for the standards based context delivery representation, looking at generic requirements, but also specifically at the requirements of 3D multimedia applications.
At present, only a very few adaptation decision systems are being used with the goal of adapting 3D content. Those that have been described in the literature make use of a very limited number of content and low-level context descriptions.	Within the context representation framework, profiles will be dedicated to the goal of adapting 3D content. Additionally, ontologies will be defined with concepts and rules that specifically address 3D multimedia applications, enabling to obtain further knowledge to assist the adaptation decision process.
Although some work has been published concerning the use of ontology based approaches for modelling context, little work exists in combining standards for low-level context with ontologies for capturing higher-level concepts for different domains of interest.	Full integration of ontologies, reasoning, and inference mechanisms with low-level metadata representation standards.

Test Scenario Demonstration



Objectives

- *Investigate and achieve a proper 3D content representation for adaptation/presentation;*
- *Investigate the feasibility of an integrated approach for 3D content adaptation decision taking;*
- *Define, represent and use, in an advance form, the necessary metadata input for the chosen adaptation decision taking approach, with the aim of providing the best QoE possible for the users.*
- *Implement a knowledge and context-based 3D content adaptation decision system.*

MAP tele DOCTORAL PROGRAMME IN TELECOMMUNICATIONS