# Chapter XLVII
# Content Adaptation for Heterogeneous Mobile Devices

**Robert Schmohl**
*Technische Universität München, Germany*

**Uwe Baumgarten**
*Technische Universität München, Germany*

**Lars Köthner**
*Comnos GmbH, Germany*

## ABSTRACT

*Recent advances in mobile computing have spawned a very heterogeneous environment of mobile devices, which is reflected by the presence of the devices' different capabilities. This chapter focuses on handling this device heterogeneity in the context of content adaptation of mobile services so that generic content can be provided to any device in the heterogeneity spectrum. We present an approach that enables mobile services to adapt its content provision to a mobile device by considering the device's content provision capabilities. Those capabilities encompass both the communication channels for content delivery and the capabilities to present content to the user. Our approach is designed as a service platform that implements a content adaptation procedure for Web-based mobile services by utilizing device capability databases and generic page transformation. This approach enables mobile devices to visualize any generic content device specifically on their integrated browsers.*

## INTRODUCTION

Since mobile computing is getting increasingly popular, the development of mobile services is getting increasingly complex, implying new challenges to be handled (Schmohl & Baumgarten, 2007; Want & Pering, 2005). One of those challenges is the highly heterogeneous environment of mobile devices, which has emerged as a consequence of the rapid mobile computing evolution

Copyright © 2009, IGI Global, distributing in print or electronic forms without written permission of IGI Global is prohibited.

of the past years. Most companies handle the heterogeneity of mobile devices by employing the Pareto principle, also known as the 80-20 rule. In this context, this approach proposes to make a mobile service available for 80% of the users, who employ 20% of devices available on the specific target market. However, although this approach may work in practice, it lacks scalability and requires a high level of maintenance implied by the constantly ongoing evolution of technologies. Hence, this solution of the problem is temporary at best.

Mobile devices' heterogeneity can be divided into hardware and software heterogeneity (da Rocha & Endler, 2005). Hardware heterogeneity reflects the presence of devices with different capabilities. Software heterogeneity describes the presence of different operating systems and applications running on mobile devices. Speaking of the provision of Web-based mobile services, we face both hardware and software heterogeneity, which is influenced by the following aspects:

- **Markup languages.** Mobile devices support several different markup languages to display output. However, most of them support only a few, so delivery of output is highly dependent on the target device's supported markup language.
- **Device output capabilities.** Devices have very different capabilities in processing output visually and acoustically (see the subsequent section about content adaptation).
- **Logical communication channels.** Mobile devices' communication is mapped on physical and logical channels. While a device's physical communication channels are intended to stay transparent to both the user and the mobile service, the awareness of logical channels does matter. From this perspective, service requests and provision occur on logical channels (e.g., SMS, MMS, e-mail, voice, etc.), whose availability is completely device-dependent.

To tackle those heterogeneity issues, we have developed a concept of a Web-based platform for mobile services that handles both content adaptation and multichannel service provision. The basic idea behind this concept is based on a single request-response dialog between the user of the mobile service and the platform providing it. The outline of this concept encompasses the creation of a generic and device-independent content-page that is adapted to the requesting device using a device capability database and XML transformation techniques. The conceptual design of the Web-based platform introduced here includes multichannel communication and modular configuration (service creation, discussed later in this chapter).

While the transformation of generic content covers the heterogeneity issues concerning devices' markup languages and output capabilities, the multichannel communication aspect enables the provision of services on different logical channels, thus handling the correspondent remaining heterogeneity issue listed previously. The aspect of configuring the platform modularly aims at omitting the need to create services by means of programming. We propose to assemble mobile services out of custom building blocks that are individually *modeled* instead of programmed. This aspect results in significant simplification of service creation, since the complexities of both the service creation and the underlying Web framework are reduced.

The conceptual design introduced here has been developed in a joint effort by the Technische Universität München and the Comnos GmbH to complement an existent mobile service platform, the *Open Dialog Platform (ODP)* (Comnos GmbH, 2007). The ODP is capable of providing services by SMS, MMS, and e-mail; thus, the work presented in this chapter aims at complementing the ODP by enabling service provision on the Web channel. We have validated this conceptualization by implementing the Web-channel platform accordingly. We will discuss the implementation

13 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/content-adaptation-heterogeneous-mobile-devices/21037

## Related Content

Tertiary Storage Devices
Phillip K.C. Tse (2008). *Multimedia Information Storage and Retrieval: Techniques and Technologies (pp. 145-155).*
www.irma-international.org/chapter/tertiary-storage-devices/27009

Building-Scale Virtual Reality: Reconstruction and Modification of Building Interior Extends Real World
Katashi Nagao, Menglong Yangand Yusuke Miyakawa (2019). *International Journal of Multimedia Data Engineering and Management (pp. 1-21).*
www.irma-international.org/article/building-scale-virtual-reality/232179

Modifying Popular Board Games to Illustrate Complex Strategic Concepts: A Comparison With a Professional Computer Simulation
Scott Gallagher, David Cavazosand Steven Harper (2011). *Gaming and Simulations: Concepts, Methodologies, Tools and Applications (pp. 1521-1529).*
www.irma-international.org/chapter/modifying-popular-board-games-illustrate/49464

Restoration of CT Images Corrupted With Fixed Valued Impulse Noise Using an Optimum Decision-Based Filter
Priyank Saxenaand R. Sukesh Kumar (2018). *Intelligent Multidimensional Data and Image Processing (pp. 220-239).*
www.irma-international.org/chapter/restoration-of-ct-images-corrupted-with-fixed-valued-impulse-noise-using-an-optimum-decision-based-filter/207898

Low Power Design Techniques for Wireless Sensor Networks
José Aedo, Natalia Gaviria, Johnny Aguirreand Danny Múnera (2011). *Emerging Technologies in Wireless Ad-hoc Networks: Applications and Future Development (pp. 15-40).*
www.irma-international.org/chapter/low-power-design-techniques-wireless/50316