Recent years have brought many changes to the world of mass media. The Internet and mobile communications technology have provided consumers with interactive digital services. Television is catching up with this trend through the digitalization process. Digital television is a hybrid platform combining elements from classical analog television and the Internet, providing modern multimedia services on a familiar platform. In short, digital TV is a gateway to the world of interactive digital media.

Digital TV brings the consumer into the television service arena and offers him new degrees of freedom. However, as the service and multimedia content types diversify and the services and their content increase, television is facing many of the same challenges of complexity and information overflow faced by other digital media.

Metadata can handle the diverse services and content of digital TV efficiently and in a consumer-friendly way. Metadata means that the data are accompanied by other data which describe them. As data about data, metadata can provide an insight into syntactically and semantically complex data by distilling their essence to a set of simple descriptors. Metadata also helps to structure and manage information in diverse settings. The use of metadata in broadcast multimedia should not be restricted to being merely a tool for coping with the challenges of a complex networked multimedia environment. Instead, metadata offers new opportunities for the development of innovative services.

The research done by the broadcasting multimedia group at the Digital Media Institute (Institute of Signal Processing, Tampere University of Technology, Finland) has given us considerable experience and expertise with broadband multimedia. Our search for novel types of interactive service led to our applying metadata to digital TV. Metadata assists in bringing existing services to a new level and creating more advanced types.

Our research has focused on applying selected metadata standards to digital TV. The search for a unified solution for integrating metadata into the television service space showed MPEG-21 to be a good candidate solution for
the creation, delivery and consumption of metadata enabled services. The *digital broadcast item model* (DBIM) catalyzes the digital item methodology of MPEG-21 into a new converging concept for deploying metadata–based services in digital TV. The idea of the digital broadcast item model (DBIM) goes back to the year 2001, when the IEEE standard for the *learning object model* (LOM) was presented at a conference in Tampere, Finland. LOM introduced unified metadata structures for e–learning content. The authors realized that a similar structure was missing from the domain of digital TV. MPEG-21 was then identified as the natural starting point for the development of a unified metadata model for broadcast multimedia.

Our subsequent research work has focused on the development of a digital broadcast model, its accompanying service architecture and the services it can offer. The research work culminated in the establishment of an MPEG *ad hoc* group “MPEG-21 in broadcasting” in 2003, chaired by the senior author of this book, to promote standardization within ISO/IEC.

This book describes how the use of the unified metadata model in digital broadcasting enhances traditional television service. Starting with a comprehensive overview of broadcast multimedia and related metadata, architectural design principles are presented for creating and using the digital TV platform services with a unified multimedia asset model within a metadata processing framework.

The digital broadcast item model (DBIM) represents a technical framework and a set of guidelines for managing services throughout the broadcast life–cycle. In short, it is a new converging concept for metadata in broadcasting. This is described in detail with emphasis on new innovative services and pathways that are likely to emerge over the next few years.

This book was written at the Digital Media Institute (Prof. Hannu Eskola, director), Institute of Signal Processing (Prof. Moncef Gabbouj, head) of the Tampere University of Technology, Finland. Our institute has provided a stimulating and open environment for the development of novel research ideas. We thank all our friends and colleagues for their discussions and companionship. Special credit goes to the members of the project teams of the broadcasting multimedia group, namely: Heikki Lamminen, Mathew Anurag Mailaparampil, Florina Tico, Mikko Oksanen, Perttu Rautavirta, Jussi Lyytinen, Heikki Mattila and Kirsi Keskiriisu.

Many thanks go to Prof. Frans Mäyrä of the Hypermedia Laboratory, Tampere University, Finland, for all his discussions about interactive, narrative media and for his stimulating viewpoints. Credit also goes to Marie-Laure Ryan for many fruitful discussions about interactive narratives. We are indebted to Ismo Rakkolainen for discussions and for screenshots of his fog screen. Thanks go to Ville Holopainen for help with editing the numerous graphics of the book. Thanks also go to Johannes Messner at the networking department at the Technical University of Linz for many years of \LaTeX tips and tricks. We thank our publisher, Springer-Verlag New York, Inc., for their help and patience. Special thanks go to Margaret Mitchell. We would also like
to thank Prof. Irek Defee and Prof. Reiner Creutzburg for their contributory discussions. Many thanks go to Hanna-Greta Puurtinen from eTampere for administrative help.

Many thanks also go to MPEG and all its marvelous members. We would like to say thanks to the MPEG ad-hoc group “MPEG-21 in broadcasting” members, especially to the co–chairs: Itaru Kaneko (Advanced Research Institute for Science and Engineering/RISE/Waseda University, Japan), Abdel-latif Benjellouontouimib (France Telecom, France) and Jong-Nam Kim (Korean Broadcasting System (KBS), Korea). To Prof. Andrew Perkis (NTNU, Norway) and Jan Bormans (IMEC, Belgium) go many thanks for bringing us closer to MPEG-21. Finally special thanks go to our families for all their love, friendship and support.

The preparation of this book has been supported by a grant from the NOKIA Foundation.

More information, book errata, software and other novelties can be found on our web–page at: http://www.digitalbroadcastitem.tv.

Tampere, December 15, 2003

Artur Lugmayr
Samuli Niiranen
Prof. Seppo Kalli
Digital Interactive TV and Metadata
Future Broadcast Multimedia
Lugmayr, A.; Niiranen, S.; Kalli, S.
2004, XV, 258 p. 79 illus., 9 illus. in color., Hardcover