
Contents

Part I Theory

1	New Paradigms in Broadcast Multimedia	3
1.1	Comparison of Classic, Analog and Modern, Digital TV	4
1.2	First Thoughts about Metadata in Broadcast Multimedia	5
1.3	Basic Definitions	6
1.4	Structure of the Book	8
2	World of Digital Interactive TV	11
2.1	Broadcast Multimedia	11
2.1.1	MPEG-2	11
2.1.2	DVB	13
2.1.3	MHP	16
2.1.4	Emerging DVB Standardization Efforts	18
2.1.5	ATSC-DASE and Open Cable	18
2.1.6	ISDB-BML	19
2.1.7	Adoption of the Standards	20
2.2	Digital TV Asset Life-Cycle	20
2.3	Examples of Digital TV Value-Added Services	23
2.3.1	Electronic Program Guide (EPG)	23
2.3.2	Information Portal	23
2.3.3	Pay-per-View (PpV)	23
2.3.4	Video-on-Demand (VoD)	25
2.3.5	Education	25
2.3.6	Shopping	25
2.3.7	Games	25
2.3.8	Standard Internet Services	25
2.3.9	Communication	25
2.3.10	Community Services	28
2.3.11	Government	28
2.3.12	Health	28

2.3.13	Finance and Banking	29
3	Metadata Fundamentals and Concepts	33
3.1	Digital TV Metadata Life-Cycle.....	34
3.2	Theoretical Foundations of Metadata	35
3.2.1	Metadata Tier Model	36
3.2.2	Theory behind the W3C Metadata Definition Family ..	37
3.2.3	Practical Example	39
3.3	W3C Metadata Families	42
3.3.1	Overview of the W3C Metadata Families	43
3.3.2	XML	44
3.3.3	XML schema	45
3.4	MPEG-7 – Multimedia Content Description Interface.....	46
3.4.1	Overview	46
3.4.2	MPEG-7 Metadata Definitions	47
3.4.3	Basic Elements and Schema Tools	49
3.4.4	Annotating Multimedia Assets	50
3.4.5	Grouping Multimedia Assets: Content Organization ...	51
3.4.6	Managing Conventional Media Archive Information ...	51
3.4.7	Easy Navigation and Access.....	52
3.4.8	Personalization, User Interaction and Consumer Profiles	52
3.4.9	Audio Descriptors	52
3.4.10	Visual Descriptors	53
3.4.11	MPEG-7 Systems	54
3.5	MPEG-21 Packages Multimedia Assets	54
3.5.1	Perception of Multimedia Assets through DIs	57
3.5.2	Digital Item Declaration (DIDL).....	58
3.5.3	Digital Item Adaptation	61
3.5.4	Road Ahead for MPEG-21	61
3.6	MHP and Metadata	62
3.6.1	‘Metadata Way’ of MHP	63
3.6.2	DVB-HTML	64
3.7	TV-Anytime	65
3.7.1	Personal Data Recorder	66
3.7.2	Content Reference Identifier (CRID)	66
3.7.3	Metadata Process Model.....	68
3.7.4	Metadata Definitions	68
3.7.5	Broadcast Channel Aspects	71
3.7.6	Feedback Channel Aspects	71
3.8	SMPTE Metadata Definitions	71
3.8.1	SMPTE Metadata Dictionary (Content & Structure) ..	72
3.8.2	Universal Material Identifier (UMID).....	73
3.8.3	Key–Length–Value (KLV)	74
3.9	Advanced Authoring Format (AAF).....	74
3.10	General Exchange Format (GXF)	76

3.11	Material eXchange Format (MXF)	77
3.12	EBU's P/META Metadata Exchange Scheme	78
3.13	Converging Broadcasting Metadata Standards	79
4	Digital Broadcast Item Model (DBIM)	87
4.1	Purpose and Objectives	88
4.2	Unified Life-Cycle and Workflow Model	90
4.2.1	Example: Converging TV-Anytime and DBIM Work Flows	93
4.3	Architectural Components – A More Detailed View	94
4.3.1	DBIM Metadata Building Blocks	95
4.3.2	Metadata Protocol Stack – Linkage Metadata Definitions	95
4.3.3	Service Architecture	95
4.3.4	Metadata Protocol Stack	97
4.4	DBIM Metadata Structures	97
4.4.1	Basic Tools	99
4.4.2	Multimedia Asset Tools	99
4.4.3	Object Tools	100
4.4.4	Service Tools	101
4.4.5	Narrative Tools	101
4.4.6	Vertical Tools	101
4.5	Digital Broadcast Item (DBI)	103
4.6	Dynamic DBI Process Model	105
4.6.1	Different Item Types in the Metadata Life-Cycle	105
4.6.2	DBO Phases	106
5	Metadata System View	109
5.1	Characteristics of the Linkage Tier	110
5.2	Metadata-Based Service Architecture	111
5.2.1	Logical Feedback Channel Architecture	112
5.2.2	Logical Broadcast Channel Architecture	115
5.3	Metadata Protocol Stack	118
5.3.1	Abstract Metadata Protocol Stack Model	119
5.3.2	Internet Protocol Suite	120
5.3.3	Transmitting Metadata over Broadcast Channel Protocols	121
5.3.4	Communication Modes on Application Layer Protocol Suites	122
5.3.5	Simple Object Access Protocol (SOAP)	125
5.3.6	Streaming Binary XML – The MPEG-7's BiM	130
5.4	Consumer devices	134

Part II Application

6	Innovations in Digital TV	143
6.1	Paradigms in Digital TV	143
6.2	Digital TV is Innovative and Disruptive	146
6.2.1	Phases of Disruptive Technology	146
6.2.2	S-Curve and Digital TV	147
6.2.3	10X and digital TV	148
6.3	Asking the Consumer	149
6.3.1	How We Perceive and Interact with ‘Things’	153
6.3.2	How We Come Together	155
6.3.3	Digital TV is ‘Alive’	156
6.3.4	Surrounded by Ambient ‘Things’	157
6.3.5	Life-style and the ‘Things’ we Move and Show	158
6.4	Creating a Narrative Taxonomy	158
6.4.1	Content of digital TV is a Digital Narration	159
6.4.2	Creating a Narrative Model for Digital TV	160
6.4.3	Multimedia Asset Space	162
6.4.4	Interaction Space	164
6.4.5	Narrative Space	168
6.4.6	Relating Spaces of the Narrative Cube	170
6.5	Consumer Model and Narrative Cube in Metadata Context ...	176
7	Conditional Access, Digital Rights Management and Security	179
7.1	Conditional Access (CA)	182
7.2	Digital Rights Management Solutions	183
7.3	Transactions and Security	186
8	Digital Production and Delivery	187
8.1	Wireless Protocols for Digital TV	187
8.2	Broadcasted On-Demand Services	188
8.3	Capturing Metadata in Production	188
8.4	Designing Metadata-Based Multimedia Repositories	194
8.5	Digital Item Stores	196
9	Intelligently Presenting and Interacting with Content	201
9.1	Real-Time Content Manipulation	201
9.2	Convergence of the Multimedia Home	203
9.3	Hyperlinked Television	205
10	Consumer Profiling and Personalization	209
10.1	A Metadata-driven Approach to Digital TV Personalization ..	211
10.2	Advanced Processing of Personalization Metadata	213
10.3	Case Scenario: TV Program Recommendation Service	216

11 Ambient TV	219
11.1 Creation of Ambient Multimedia as Concept for Digital TV ...	219
12 Other Application and Service Scenarios	223
12.1 Evolving Wireless Story – Big–Brother TV	223
12.2 Digital Soap Operas	223
12.3 Live Sport Event Tracking	224
12.4 Live Tracking	224
12.5 Wearable TV	224
12.6 3D-TV	224
12.7 Display Technology	224
12.8 Vision–Based Digital TV Mouse	225
12.9 Digital TV as Personal Life Organizer	226
13 Road Ahead in Broadcast Multimedia	227
14 Abbreviations and Acronyms	233
References	245
Index	257

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

ISBN: 978-0-387-20843-5