
Serious Games

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Editors

Serious Games

Foundations, Concepts and Practice

Editors

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ISBN 978-3-319-40611-4

DOI 10.1007/978-3-319-40612-1

ISBN 978-3-319-40612-1 (eBook)

Library of Congress Control Number: 2015938750

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Printed on acid-free paper

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The registered company is Springer International Publishing AG Switzerland

Preface

Entertainment, fun, challenge, motivation, excitement, and interest: These are some of the positive associations people have when they think about computer games. Recent developments—from powerful graphic processing units, smartphones and other mobile devices, to novel interaction devices such as 3D cameras or VR glasses—all increase the chances that the next generation of digital games will be able to strengthen these positive associations. This makes it even more tempting to think about how to use digital games for purposes other than “just” playing. Who would not want to use software, e.g., for learning that is entertaining, fun, challenging, motivating, exciting, and interesting? Who would not want to develop such software? Who would not want to provide such software to others?

A *serious game* is a name given to computer software that tries to achieve just that. While some people think that *serious games* and *games for learning* are synonymous, digital games can be used for “serious” purposes other than learning. Serious games can be used for motivating people to exercise more. Serious games can be used for medical treatment. Serious games can be used as a marketing tool. These are just a few examples, and we will illustrate various application areas with many actual serious games in this book.

Much practical work and much research have already been carried out in the field of serious gaming. The field is leaving its infancy. This book does not report the latest research results and insights, but strives to consolidate what has been achieved so far. This book is a textbook that aims to provide an introduction to the fundamentals of serious games and an initial guide to this fascinating field. As serious games differ considerably from computer games that are meant for pure entertainment, this textbook focuses on the former.

Computer games are truly multidisciplinary, with computer scientists, artists, user interface designers, game designers, psychologists, and musicians contributing to their development. Given the large number of potential application areas for serious games, the number of disciplines that might be involved in their development is even higher. Chemists, sport scientists, teachers, journalists, marketing experts, historians, medical doctors—they could all provide a valuable contribution to a serious game. We editors have enlisted the support of over 50 authors in order to gather all the competencies necessary to write this book. Among the authors are

not only researchers in various disciplines whose expertise lies in serious games, but also persons who have actually designed, created, and evaluated serious games.

As this book is meant for introduction and guidance, we editors took great care that the book hides the fact that it was written by many authors. Our task was to ensure that this book is not an incoherent collection of articles about serious games, but is well structured, easily understandable, and highly consistent.

Undergraduate and graduate students from various disciplines who want to learn about serious games are one target group of this book. They can use it as an accompanying textbook to a lecture or as background reading, e.g., for a seminar. In Chap. 1, we provide some teaching suggestions for how this book can be used in both courses that are dedicated to serious games, and courses about game-based learning or entertainment computing.

Students are not the only ones interested in serious games. Another target group is prospective users of serious game technology. The book provides them with a solid basis for judging the advantages, limitations, and application areas of serious games. This book also discusses resources and other economic aspects. Readers will be able to develop an understanding for the production process and to judge its complexity. Moreover, they will be provided with a methodology of how to assess if a serious game actually meets its goals.

Prospective developers of serious games are another target group of this book. If they are already familiar with the development of games for pure entertainment, they can use the book for self-study in order to learn about distinctive features of serious game design and development.

To cater to this heterogeneous readership and wide range of interests, we made this book flexible to use. We expect all readers to read Chap. 1, as it provides some basics, e.g., a terminology, that will be used in all other chapters of the book. Readers can then choose the chapters they find particularly interesting, and work through those chapters in any order. Teachers can select chapters and a sequence that is most suitable for their course or seminar. The book contains suggestions for courses such as “Introduction to Serious Games”, “Entertainment Technology”, “Serious Game Design”, “Game-based Learning”, or “Applications of Serious Games”. Moreover, the book can serve as additional literature in a course (e.g., about game development or eLearning) that touches on the subject of serious games. The book’s chapters can also serve as introductory texts for student assignments on original literature in the research field of serious games and entertainment computing.

The eleven chapters that follow Chap. 1 cover the creation of serious games (design, authoring processes and tools, content production), the runtime context of a serious game (game engines, adaptation mechanisms, game balancing, game mastering, multi-player serious games), the effects of serious games and their evaluation (player experience, assessment techniques, performance indicators), and serious games in practice (economic aspects, cost benefit analysis, serious game distribution). A description of many practical examples for serious games can be found in the last chapter of the book.

More specifically, the chapters of this book are clustered into four parts. The first part focuses on the creation of serious games. This is an interdisciplinary effort requiring skills in areas such as computer science, art and design, psychology, didactics, and storytelling. The basics that are fundamental for interdisciplinary collaboration are laid in Chap. 2. In the following chapters, the design of serious games (Chap. 3), authoring processes and tools (Chap. 4), and the content of serious games and its production (Chap. 5) are addressed.

The second part examines the phase when the finished serious game is played. Important aspects are game engines (Chap. 6) that are the backbone during runtime. Peculiar for serious games is the need for personalization and adaptation; Chap. 7 deals with adaptation mechanisms, game balancing, and dramaturgy. Game mastering in serious games is often application-dependent. In game-based learning, for instance, the game master may have the role of a tutor or instructor at the same time; Chap. 8 discusses game mastering together with social aspects of serious games, especially in multi-player games.

The third part takes a look at the effects of serious games and their evaluation. Chapter 9 discusses the goal to entertain and shows how the game experience can be measured. It also introduces the concept of player experience. In addition, evaluation techniques that are vital for games in general (such as the evaluation of the game's usability) are addressed. Chapter 10 focuses on the assessment of how far the goals pursued with the serious game are met. In this chapter, evaluation techniques are presented, and indicators for the performance of a serious game are identified.

Finally, the fourth part discusses serious games in practice. A collection of 37 examples of serious games is contained in Chap. 12. Each set of examples highlights different purposes of serious games: training and simulation, learning and education, health, societal and public awareness, heritage and tourism, and marketing. As a basis for the discussion, Chap. 11 addresses economic aspects of serious games such as budgeting, cost benefit analyses, and serious game distribution.

We editors would like to thank all authors involved in this book project: Without their competence, their enthusiasm, and their dedication, this book would not have been possible. We also thank Springer, our publisher. Special thanks go to Ralf Gerstner from Springer, Carolyn Gale for proofreading, and Rolf Kruse who was responsible for all the illustrations in this book.

Darmstadt, Wiesbaden
March 2016

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Contents

1	Introduction	1
Ralf Dörner, Stefan Göbel, Wolfgang Effelsberg and Josef Wiemeyer		
1.1	What Are Serious Games?	2
1.2	Motivation	4
1.3	Terminology	6
1.4	A Reference Scenario for Serious Games	13
1.5	Overview of the Development Process of Serious Games	17
1.5.1	Game Idea and Game Design	18
1.5.2	Game Architecture and Game Production	20
1.5.3	Game Adaptation Mechanisms	22
1.5.4	Game Platforms	23
1.5.5	Game Authoring Environment	24
1.5.6	The Game Development Team	25
1.6	A Short History of Serious Games	26
1.7	How to Use This Book	27
1.7.1	Organization of the Book	28
1.7.2	Readership	29
1.7.3	Teaching Suggestions	29
1.8	Summary and Questions	30
Recommended Literature		31
References		32
2	Contributing Disciplines	35
Ralf Dörner, Anna Lisa Martin-Niedecken, Mela Kocher, Tom Baranowski, Michael Kickmeier-Rust, Stefan Göbel, Josef Wiemeyer and Paul Gebelein		
2.1	Computer Science	36
2.2	Art and Design	38
2.3	Psychology	40
2.4	Didactics and Pedagogy	43
2.5	Stories and Storytelling	47

2.6	Interdisciplinary Collaboration	49
2.7	Summary and Questions	51
	Recommended Literature.	52
	References.	52
3	Design of Serious Games.	57
	Philip Mildner and Florian ‘Floyd’ Mueller	
3.1	How to Design a Serious Game	57
3.2	Game Characteristics	59
3.3	Defining a Game Scenario	62
3.4	Experimental Game Design	65
3.4.1	Practical Advice	66
3.5	Bringing Together Serious Content and Gaming	67
3.6	Game Mechanics	70
3.7	The Development Cycle.	75
3.8	Conclusion.	78
	Recommended Literature.	79
	References.	80
4	Authoring Processes and Tools	83
	Florian Mehm, Ralf Dörner and Maic Masuch	
4.1	Authoring Challenges	84
4.2	Authoring Approaches.	85
4.2.1	Basic Approaches	85
4.2.2	Author Support Mechanisms.	86
4.3	User-Centered Design	89
4.4	Agile Software Development	91
4.5	Authoring Tools	94
4.5.1	Categorization of Tools	94
4.5.2	Toolchains and Ecosystems	95
4.5.3	Example: Unity.	97
4.5.4	Example: StoryTec	99
4.6	Summary and Questions	103
	Recommended Literature.	104
	References.	105
5	Content and Content Production	107
	Florian Mehm and Benjamin Guthier	
5.1	Overview.	107
5.2	Definition of Content.	109
5.2.1	Triangle Meshes	109
5.2.2	Materials	110
5.2.3	Textures.	111
5.2.4	Animation	111
5.2.5	Audio	111
5.2.6	User Interface Elements	112

5.2.7	Miscellaneous Assets	112
5.2.8	Combination of Assets	113
5.2.9	Serious Content	113
5.3	Content Production Pipeline	114
5.3.1	Content Creation	114
5.3.2	Exporting	115
5.3.3	Optimization	116
5.4	Procedural Content Generation	116
5.4.1	Basic Methods of Content Generation	118
5.4.2	Best Practice for Procedural Content Generation	119
5.4.3	Examples of Procedural Content Generation in Serious Games	120
5.5	Content Management	120
5.6	Serious Content Integration	122
5.7	Summary and Questions	124
	Recommended Literature	124
	References	125
6	Game Engines	127
	Jonas Freiknecht, Christian Geiger, Daniel Drochert, Wolfgang Effelsberg and Ralf Dörner	
6.1	The Architecture of Game Engines	128
6.1.1	Hardware	128
6.1.2	Operating System	130
6.1.3	Platform Independence Layer	130
6.1.4	Third Party Libraries	130
6.1.5	The Engine Core	131
6.1.6	The Network	135
6.1.7	Resource Management	136
6.1.8	Input Devices	136
6.1.9	Audio	136
6.1.10	Graphics and Rendering	137
6.1.11	The User Interface	138
6.1.12	Gameplay and Scripting	139
6.2	Event Processing	140
6.3	Animation	140
6.3.1	The Animation Production Process	141
6.3.2	Animation for Games	143
6.4	Physics and Collision Detection	144
6.4.1	Simulating Physics	144
6.4.2	Collision Detection	145
6.5	Lighting	145
6.5.1	Light Sources	146
6.5.2	Material Reflection (the Phong Reflection Model)	147

6.5.3	Shading Models	148
6.5.4	Atmospheric and Post Processing Effects	148
6.5.5	Global Illumination	149
6.6	Shaders	150
6.7	Game Object Editors	150
6.8	Game Engine Support for New Hardware	151
6.8.1	New Hardware Devices	151
6.8.2	Virtual and Augmented Reality	153
6.8.3	Support for New Hardware in Game Engines	153
6.9	Selection of a Suitable Game Engine	154
6.9.1	Unreal Engine 4	155
6.9.2	Unity 5	155
6.9.3	CryENGINE 3	156
6.9.4	Other Engines	156
6.10	Summary and Questions	156
	Recommended Literature	158
	References	158
7	Personalization and Adaptation	161
	Stefan Göbel and Viktor Wendel	
7.1	Adaptation—Definition	162
7.2	Adaptation—Dimensions and Mechanisms	164
7.2.1	Difficulty Adaptation—The Flow Concept	164
7.2.2	Player Modeling	167
7.2.3	Learner Modeling	170
7.2.4	Adaptation Concepts and Algorithms in Educational Games	174
7.3	Adaptive Storytelling—Story Models, Interaction and Sequencing	175
7.3.1	Story Models	175
7.3.2	Interaction—Interactive Storytelling	179
7.3.3	Sequencing—Linear and Non-linear Story Forms	182
7.4	Narrative Game-Based Learning Objects	184
7.4.1	Conceptualization of Narrative Game-Based Learning Objects	185
7.4.2	Definition of NGLOB	188
7.5	Adaptive Digital Educational Games—Best Practice 80Days	190
7.5.1	Save the Earth	191
7.5.2	Bat Cave	200
7.6	Summary and Questions	203
	Recommended Literature	206
	References	206

8 Multiplayer Serious Games	211
Viktor Wendel and Johannes Konert	
8.1 Introduction	211
8.2 Forms of Multiplayer Serious Gaming	215
8.2.1 Multiplayer Types and Techniques	215
8.2.2 Multiplayer Game Genres	217
8.2.3 Multiplayer Interaction	221
8.3 Collaborative Learning in Multiplayer Serious Games	223
8.3.1 Collaborative Learning	224
8.3.2 Computer-Supported Collaborative Learning	226
8.3.3 Game-Based Collaborative Learning	226
8.4 Multiplayer Game Design	229
8.4.1 Number of Players	229
8.4.2 Persistence	230
8.4.3 Matchmaking	230
8.4.4 Competitive Versus Collaborative Gameplay	233
8.4.5 Game Speed and Flow	234
8.4.6 Communication Between Players	234
8.4.7 Social Issues: Toxic Behavior and Virtual Property	235
8.5 Summary and Outlook	236
Recommended Literature	237
References	238
9 Player Experience	243
Josef Wiemeyer, Lennart Nacke, Christiane Moser and Florian ‘Floyd’ Mueller	
9.1 Introduction	244
9.2 User Experience as a Precursor of Player Experience	245
9.3 Psychological Models of Player Experience	247
9.4 Integrative Models of Player Experience	253
9.5 Measuring Player Experience	258
9.5.1 Physiological Evaluation	259
9.5.2 Surveys	261
9.6 Fostering Player Experience	262
9.7 Summary and Questions	266
Recommended Literature	267
References	268
10 Performance Assessment in Serious Games	273
Josef Wiemeyer, Michael Kickmeier-Rust and Christina M. Steiner	
10.1 Introduction	273
10.2 Performance in Games—Concepts and Measures	275
10.3 Online Assessment	283

10.4 Offline Assessment	290
10.5 Performance Assessment and Game Adaptation	295
10.6 Summary and Questions	296
Recommended Literature	297
References	298
11 Serious Games—Economic and Legal Issues	303
Stefan Göbel, Oliver Hugo, Michael Kickmeier-Rust and Simon Egenfeldt-Nielsen	
11.1 Introduction: Status Quo of the Serious Games Market	304
11.2 Economic Issues—Market Analysis and Business Models	306
11.2.1 Market Analysis	306
11.2.2 Job Market and Qualification Programs	308
11.2.3 Market Access	309
11.2.4 Funding Schemes	309
11.2.5 Business and Distribution Models for the Entertainment Sector	310
11.2.6 Business and Distribution Models for Serious Games	311
11.2.7 Cost-Benefit Aspects	312
11.3 Legal Issues—Ethics, Gender, Data Protection and Privacy	313
11.3.1 Sensitive Ethical Aspects	313
11.3.2 Privacy and Data Protection	313
11.3.3 Gender Aspects	314
11.4 Summary and Questions	315
References	317
12 Serious Games Application Examples	319
Stefan Göbel	
12.1 Introduction	320
12.2 Games for Training and Simulation	329
12.2.1 VIPOL—Virtual Training for Police Forces	329
12.2.2 Lost Earth 2307—A Serious Game for Image Interpretation	331
12.2.3 3DSim@GBT—Planning, Simulation and Training	334
12.2.4 Mega Airport—Realistic Airport Visualizations	336
12.2.5 Ship Simulator—Rescue Simulation for Enthusiasts	337
12.2.6 SchaVIS—Flooding Simulation and Prevention	339
12.2.7 Seconds—Supply Chain Management	341
12.2.8 Learn2work—a Highly Adaptable Company Simulation	343
12.2.9 Sharkworld—Professional Project Management Training	345
12.2.10 Houthoff Buruma—Recruitment and Assessment	347

12.3	Educational Games	348
12.3.1	Ludwig—Digital Educational Game for Physics	348
12.3.2	Physikus HD—Learn Adventure for Physics	350
12.3.3	80Days—Adaptive Game (Prototype) for Geography	351
12.3.4	Roma Nova—Teaching History with CG and BCI	353
12.3.5	Uni Game—Insights to Universities and Campus Life	356
12.3.6	Internet Hero—Learning the Pros and Cons of the Internet	357
12.3.7	Yes or Know—Combining Board Games and Smart Play	358
12.3.8	Bionigma—Science Game for Protein Exploration	359
12.3.9	Meister Cody—Educational Game for Dyscalculia	361
12.4	Games for Health	363
12.4.1	Play Forward—HIV Prevention	363
12.4.2	Respir Games—Asthma Therapy	366
12.4.3	BalanceFit—Balance, Coordination and Strength Training	367
12.4.4	Dance with ALFRED—Collaborative Dancing	369
12.4.5	NeuroVitAALis—Personalized Cognitive Training	371
12.4.6	KickAss—Autism Game for Adolescents	373
12.4.7	Zirkus Empathica—Autism Game for Children	375
12.4.8	SPARX—Mental Health Game for Youths & Adolescents	377
12.5	Societal and Public Awareness Games	379
12.5.1	Missio for Life—Exploring the World’s Social Problems	379
12.5.2	Lotte—Holocaust Remembrance	380
12.5.3	Purpose—Racism and Sexism	382
12.5.4	Utopolis—Democracy Simulation	383
12.5.5	Great Flu—Awareness Game for the Flu Virus	385
12.5.6	Global Conflicts—A Serious Games Series for Social Studies	386
12.6	Pervasive Gaming, Cultural Heritage and Tourism	389
12.6.1	FreshUp—Pervasive Gaming in a Campus Environment	389
12.6.2	REXplorer—Sightseeing Game	391
12.6.3	Jogging Over a Distance—Healthy, Pervasive Gaming	394

12.7	Marketing Games	395
12.7.1	Quest for Oil—Branding Game	395
12.8	Serious Games Archives	397
12.9	Summary and Outlook	399
	Recommended Literature	401
	References	401
	About the Authors	407
	Index	417