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## 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.

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