Preface

ABOUT THE SUBJECT

Computer games is a multidisciplinary area that presents an exponentially growing impact on the economy, creating huge business opportunities generating large investments and large returns, new employment opportunities for professionals of several areas, from designers to programmers, from psychologists to mathematicians, from managers to politicians, from marketers to investors; increasing offer of graduation and post-graduation studies by universities worldwide.

This domain claims for new professionals that are not yet enough at the labor market, but that higher education is already alert and preparing them. Simultaneously it is creating social impact on individuals and society, not always on a positive direction. Hence, opportunities and challenges must converge in order to take the maximum social, economical and educational profit of the emerging potential of this field.

Business, Technological and Social Dimensions of Computer Games: Multidisciplinary Developments is a collection of the most recent developments in all embraced fields of knowledge or disciplines of computer games development, encompassing planning, design, development, marketing, business management, and consumer behavior.

With the mission of discussing the main issues, challenges, opportunities and trends related to this explosive range of new developments and applications, in permanent evolution, the overall objectives achieved with the compilation of works at the readers' hands are: to discuss the impact of this emerging industry, new professions, and new users; to present new technological developments related to the requirements of this industry; to present practical solutions and state-of-the-art technologies; to discuss social and individual impact; to provide guidance for further research and development; and to build a bridge between research and practice.

Throughout its five sections, the book covers the following topics:

- The technological dimension, addressing: supporting technologies and tools; computing developments and requirements; communication tools and human-computer interaction.
- The business or industry dimension, including: emerging businesses; business opportunities and applications; studies of opportunity and impact; critical success factors; legal aspects and copyright issues.
- The human and social dimension, comprising; psychological aspects; behavioral effects and social effects.

ORGANIZATION OF THE BOOK

This book is a compilation of 29 contributions to the discussion of the business, technological and social dimensions of computer games.

These 29 chapters are written by a group of 67 authors that include many internationally renowned and experienced researchers and specialists from several disciplines and a set of younger authors, showing a promising potential for research and development. Contributions came from all over the world and integrate contributions from academe, research institutions, and industry, representing a good and comprehensive representation of the state-of-the-art approaches and developments that address the several dimensions of this fast evolutionary thematic.

Business, Technological and Social Dimensions of Computer Games: Multidisciplinary Developments is organized in five sections:

- Section 1 – "Supporting Technologies and Tools" comprises eight chapters where the reader will contact with the main technological developments and tools that support and enhance the development of computer games.
- Section 2 – "Human Computer Interaction" addresses the main developments, recent technologies and applications and main concerns related to human-computer interaction in computer games development and utilization.
- Section 3 – "Psychological, Behavioral and Social Effects" includes seven chapters that focus essentially on the psychological, behavioral and social aspects and effects of computer games.
- Section 4 – "Business Opportunities and Applications" is concerned with business opportunities and business models.
- Finally, Section 5 – "Property Rights" targets issues related to intellectual and property rights of computer games.

In the eight chapters of Section 1, "Supporting Technologies and Tools," the reader will contact with the main technological developments and tools that support and enhance the development of computer games.

The first chapter, "Video Games as Aggregating Mediums and Resulting Products of Several Visual Communication Languages," analyses the conception and the design process of a video game, which, like other areas of visual production, such as comics, illustration and animation (digital) has several steps of formal and conceptual development. These steps are based on areas of knowledge and development such as drawing, digital 2D and 3D production and motion graphics. The authors begin by analyzing the importance of drawing as the mean and instrument of initial definition and design of characters, environments, narrative and expressiveness of the game elements along with its narrative and next analyze the production and digital post-production processes of the game from which the ideas and initial intentions are digitally reproduced. Steps such as 3D modelling, character animation, and composition are also addressed. Finally, the chapter discusses the importance and function of motion graphics inside the game experience and the game contexts in which this communication feature is applied.

In "AI Design for Believable Characters via Gameplay Design Patterns," the authors address the problem of creating human-like, believable behavior for game characters. To achieve character believability in games, the game designer needs to develop that character so that it fulfills as many aspects of believability as possible. With believable behavior, the authors mean that the game is consistently

structured in terms of narration or gameplay so that it is possible to build and maintain coherent relations between the actions of the characters. The chapter includes an analysis of the general patterns for game characters design in detail concentrating on the aspects that are relevant to the AI design and introduces an agent architecture that the authors are developing, and discuss how this architecture can address the identified design patterns.

"A Practice-Based Analysis of Social Interaction in a Massively Multiplayer Online Gaming Environment" analyzes behaviour in on-line games from a practice-oriented perspective and focuses on how individuals create and sustain social structures. It reports on research based in MMOGs (Massively Multiplayer Online Games) that investigates how and what the players do in the gaming environment can give rise to structures that continue to exist outside that environment. The analysis centres on the notion of how practice is framed within the game; the methodology is one based on virtual ethnography. It describes the activities of a group of gamers in both MMOGs and other on-line settings. It also demonstrates how such players develop an identity as members of a 'community of games players' and how their gaming practices are not based around a single game but are spread across several different platforms.

Character animation has a crucial role in modern videogames: it is essential to provide a realistic and immersive experience to the users. Chapter 4, "Character Animation: Past, Present and Future" presents the main problems when preparing characters for animation, describes current solutions, and discusses published research and future directions in the fields of character rigging and animation. Its main focus is on facial animation, which is the key element to convey emotion and personality to a 3D character. It also describes a system we have developed and used on several productions, capable of automatically transfer the facial rig and animations between characters. After reading this chapter, you should have an understanding of the complexity involved in character animation process, especially of the face, and the reasons why it remains a challenge.

Agent technologies can be considered a suitable solution for coping with the games requirements to be ease-of-use, to induce newbies to play, and to maintain the game hard to master, to induce players to play for a long time. In fact, their learning and coordination capabilities make them the right means for both realizing online games and supporting players in all the operation that are necessary to play a game. The goal of "Enhancing Online Games with Agents" is to describe the main reasons for which multi-agent systems are considered one of the most interesting technologies for the development of online games and for providing the most appropriate services to maintain game communities. It particular, this chapter introduces JADE, a software framework designed to aid the development of multi-agent applications, and shows how it can be used for the realization of online games that want both to be accessible through heterogeneous network and devices and to provide a smart set of services for their game communities.

Chapter 6, "Questing for Standards: Role Playing Games in Second Life" reports on movements toward de facto standards for role playing games in the freely accessible and configurable shared virtual environment of Second Life. All users can not only freely join, but also construct and implement role playing games of their own design. Consequently, new games are constantly emerging, and others either persisting or failing. The resulting body of practice has implications for business, technological, and social dimensions of computer games. To elucidate these implications, this chapter presents the case of the Role Play Nexus, a venue created for role playing game designers, managers, and players to share experiences, questions, resources, and proposals for sustainable ventures and communities in Second Life. Issues, controversies, and problems are identified, and solutions and recommendations discussed.

Source material is drawn from transcripts of public lectures, discussions and demonstrations, from interviews, and from participant observation.

The growth of the game industry shows a great market to be conquered. However the gaming market now has consumers increasingly demanding and hungry by quality games, not just graphics, but also related to more gameplay and challenge. Chapter 7, "Artificial Intelligence in Games Evolution" provides an overview over a large area that is increasingly used by game developers, the artificial intelligence (AI). The main objective is to highlight the main reasons that make the great investors to be fascinated with the AI techniques in games. Indeed, a new paradigm of game is to be defined and introduce this is also the mission of this chapter. As a final objective, this material is intended to be a source of learning and encouragement for beginners in developing games and even for those who are curious about the subject.

Interactive digital storytelling (IDS) aims at generating dramatically compelling stories based on the user's input. During the two decades of research, IDS has promised to change the way computer games tell stories. Chapter 8, "Once Upon a Time: The Convergence of Interactive Storytelling and Computer Games" reviews the theory behind IDS as well as the current state of IDS research and studies whether – and how – IDS can improve storytelling in computer games.

Section 2, "Human Computer Interaction," addresses the main developments, recent technologies and applications and main concerns related to human-computer interaction in computer games development and utilization

Chapter 9, "Game Led HCI Improvements," covers the recent advances in HCI technology related to peripheral gaming devices. It conveys the technological and engineering basis of the key current and successful technologies. Further, it looks at the potential for future developments in this area – in terms of gaming opportunities, but also with regard to serious applications. In doing so, the chapter aims at providing a historic perspective on gaming interface technology and how changes in such technology have paralleled major waves of change within the game industry; explaining the current technologies with a view to their inherent capabilities and limitations; identifying and delineating the emergence of a gross-motor or whole-of-body approach to game-control; demonstrating the potential of employing this gaming technology for "serious" (non entertainment) purposes by highlighting several recent academic and medical initiatives in the area; in other words, where gaming HCI has been incorporated into mainstream information technology.

A primary goal of virtual environments is to support natural, efficient, powerful and flexible human-computer interaction. But the traditional two-dimensional, keyboard- and mouse-oriented graphical user interface is not well-suited for virtual environments. The most popular approaches for capture, tracking and recognition of different modalities simultaneously to create intellectual human-computer interface for games will be considered in "Human-Computer Interaction in Games Using Computer Vision Techniques." Taking into account the large gesture variability and their important role in creating intuitive interfaces, the considered approaches focus one's attention on gestures although the approaches may be used also for other modalities. The considered approaches are user independent and do not require large learning samples.

Current efforts in computer game development have been concerned with overcoming entertainment objectives. In fact, there has been much effort aiming at finding, in computer science, resources to improve games in order to allow their application into education, business or politics processes. The effective introduction of these products in society requires that they are designed as accessible as possible to all individuals, including those ones belonging to minorities with special needs. In order to reach accessibility requirements, it is desirable to attend adaptability and usability requirements to provide

products with higher quality and acceptance rate. Chapter 11, "Human-Computer Interaction and Artificial Intelligence: Multidisciplinarity Aiming Game Accessibility" discusses the potential of combining the human-computer interaction and the artificial intelligence areas aiming at promoting accessibility in games and, as a result, making them more democratic and useful for society, particularly for people who depend on assistive technology resources.

The continued evolution of mobile technology provides for new means of interaction and engagement in our daily lives. The interconnectedness, availability, and rapid adoption of mobile computing means users can expect to have access to data and information on their terms. Likewise, games and means of play are increasingly common on mobile devices. "Mobile Gaming: Exploring Spaces and Places" seats a discussion of mobile game development within the context of place and space to reveal how we can improve our understanding of mobile interaction and begin to merge our view of physical and digital spaces. By applying the ideas of place and space to mobile game development, game applications can encourage users to broaden their view of the spaces around them and strengthen the developments of interactions in a mobile world.

With seven chapters, Section 3– "Psychological, Behavioral and Social Effects" focus essentially on the psychological, behavioral and social aspects and effects of computer games.

Chapter 13, "A Multiplayer Team Performance Task: Design and Evaluation" describes a Team Performance Task (TPT) that has been designed to assess the status of a three-person team operating a game-like multiplayer task requiring inter-player cooperation to achieve optimal performance effectiveness. The objective of the TPT is to extract features of an operational setting that may be integrated into a task scenario that will yield multi-dimensional indices of both individual and team performances that are sensitive to alterations in the workload parameters and to the skill level and cohesion of the players. The design of a prototype task is described in detail, and evaluative results based on observations of five groups of three players are presented to show the individual and team metrics of performance effectiveness that are made available with this task. Future applications of the TPT are suggested, to include its potential to diagnose and support the cohesiveness and operational readiness of teams operating within space-based and other challenging environments.

There is little research into the emotional dimension of creative industry personnel, such as computer game designers, and how emotions relate to their creative practices and work-related events. Such socioemotional work is the focus of "Emotional Journeys in Game Design Teams". There is a practice-centered relevance to this topic too – it is reported that there exists a poor quality of life in many global game studios. Given our deficient knowledge of emotions in computer game development, and the practical resonance of this topic, our key research question is: What emotions, creative practices and work-related events characterize emotional journeys in computer game design teams, and how do these characteristics inter-relate? To explore and answer this research question, we draw on an in-depth field study of a computer games studio in Singapore. The chapter offers a theory of emotion-mediated improvisation as a coping model for the tumultuous emotional journeys that game developers endure.

"The Contribution of Videogames to Anti-Social Attitudes and Behaviours amongst Youngsters" aims to contribute to the growing debate surrounding the impact of video games on social practices by reporting on a small-scale, ethnographic study into the use of these games and the practices of youngsters in a small town in Portugal, with a particular focus on the relationship between video-gaming and violent and aggressive social behaviours. Using questionnaires and interviews, the video-gaming habits of 136 youngsters, were assessed. It was found that many youngsters are playing games which are not appropriate for their age group, and that long hours are spent at computer screens on these games without parental

control or supervision. Although the small-scale nature of this study does not allow us to generalise its conclusions, its findings are relevant and can point the way for future studies of this type. The centrality of video games in the lives of children and teenagers today is such that these and the practices they engender need to be taken into account when considering the rise of anti-social, aggressive, and at times violent attitudes and behaviors amongst youngsters.

A qualitative case study of student game play is presented in "Gamer Talk: Becoming Impenetrably Efficient," describing how game player communication becomes increasingly complex, efficient, and impenetrable by those who have not actively played the game. Transcripts of gathered video tape reveal how student 'gamer talk' became increasingly implicit, using terminology provided by the game and their shared context of playing the game. Over time, communication among game player group members generally became more efficient and less penetrable by members outside the group (such as new players), as players engaged in culture-building activities around their shared context. However, players occasionally became more explicit in their communication when grounding was required to reach shared meaning, such as in instances where players disagreed on the purpose of a particular game feature or strategy. Finally, implications are offered to suggest ways in which gamer cultures can be made more accessible to game designers and those guiding classroom interactions.

Chapter 17, "Playing with Violence: An Updated Review on the Effects of Playing Violent Electronic Games" focuses on electronic game content and specifically on the short-term effects of playing violent games (VG). The subject of media violence is not new and has contributed heavily to a variety of scientific and public debates over the last six decades. Conclusions are twofold: violence has been the most predominant content in media entertainment, such as television and electronic games, and exposure to violence has negative effects on media viewers and video game players. The debates around this subject reflect the incongruity of the results and interpretations, mainly because the findings are neither obvious nor simple, and some questions remain unanswered. At one extreme the validity of some findings has been questioned by a number of scholars and the media industry. At the other extreme certain moral interpretations have obscured the understanding of the scientific findings, for instance the claim that VG are directly responsible for particular types of juvenile crime (e.g., school shootings) without taking into account the complexity of violence in our society.

Videogames are in transition from an adolescent playtime to a major economic and cultural force in American society. There is an opportunity at this critical juncture to pull together the threads of discourse to develop a mature research agenda. To do so, we must understand the ultimate status of gaming research in our recent past. The objective of chapter 18, "Knowing the Game: A Review of Videogames and Entertainment Software in the United States: Trends and Future Research Opportunities" is to conduct a review analysis of the videogame and entertainment software industry, broadly defined, in the United States. This chapter investigates research productivity over the last ten years and focuses on the peer-reviewed, refereed journal articles published in this space. The chapter serves as an introduction to current thinking about the role of games in our society and the results of this study draw insights into the present and future of gaming research. It also indicates that although videogame and entertainment software research is growing, it is limited.

Unlike "serious games" that focus on education and "conditioning" the mind, meaningful games will cultivate emotional intelligence, somatic awareness, and archetypal integration in order to "un-condition" the mind and thereby facilitate psychologically meaningful personal transformations. Meaningful game research will access the dynamics of psychological transformation in order to enhance archetypal awareness, intuition, and insight on the part of players. Within the genre of meaningful video games, Drama-Based

Games (DBG) add an unprecedented dimension for psychological engagement and decision-making. Because they extend psychological player immersion to the dimension of "physical" interactivity, (DBG) incorporate the full range of psychological functions defined by Carl Jung. Because psychological experiences are correlated with physiological processes, DBG may be used as research instruments for quantifying diverse biometric-psychological interactions that occur during game play. Advances in electronics now enable the real-time and non-intrusive capturing of physiological data such as brain waves, heart-rate variability, skin response, and facial expression. This data can provide an objective basis for measuring dimensions of the cognitive unconscious in test subjects as they respond to game experiences. The ultimate goal of Chapter 19, "Meaningful Video Games: Drama-Based Video Games as Transformational Experience," is to provide veridical data relative to the psychological parameters of an increasingly mediated global environment—a Psychecology—and to study the ensuing world-view.

Business opportunities, business models are the main concern of the eight chapters elected to integrate Section 4 – "Business Opportunities and Applications."

Today, more and more enterprises are using the opportunity to collaborate in enterprise networks – especially when they are addressing global markets. The creation of such a Virtual Organization is not necessarily an easy task because often the participating partners are not prepared for collaboration. Therefore, enterprises who plan to cooperate in VOs should seek to participate in strategic networks or pools which act as breeding environments for VOs – the so-called VO Breeding Environments (VBEs). The main function of a VBE is to enhance the preparedness of their members to collaborate as soon as a business opportunity arises. Chapter 20, "Application of Serious Games in Industrial Contexts," describes application areas for serious games in the context of such Collaborative Networked Organizations. A classification scheme for serious games has been developed based on two different approaches: one based on a process framework, the other one based on a game genome approach. Both are applied on a number of known serious games with the objective to identify uncovered areas and gaps. These gaps represent new opportunities for the application of serious games which has not yet been realized.

"Building Customer Relationship through Game Mechanics in Social Games" examines mechanics of game design in social games that are used in building customer relationship. The developments in the game industry towards service orientation, and increased emphasis on social design, have resulted in overlap of game design and business design. This chapter examines the junction of these domains in contemporary social games, by studying how game design is used in pursuing business goals of the related business models. Several virtual worlds and social games are examined with the support of secondary data provided by experts in the field. The identified mechanics are then categorised and analysed in the context of business model literature on customer relationship building. The results provide several game mechanics that are located in the union of game design and business planning. Moreover, the results imply a new approach to game design in general by exemplifying how the traditional way of thinking about game design is no longer sufficient when the design of engaging mechanics needs to meet with business goals.

The use of games to deliver advertising messages is becoming an increasingly important trend in advertising since it allows for the reaching of certain targets which are difficult to reach with the traditional media, as well as engaging individuals through an interactive environment. This strategy is part of branded entertainment in which brands are inserted in content which consumers seek with entertainment purposes. Initially, advertising in games was made solely through the placement of products or brands in existing games, and it could be done through around-game advertising or in-game advertising. However, a new concept has arisen – the advergame – which is an advertising hybrid with the specific

purpose of advertising a specific brand or product. In this new genre, the brand has absolute control over the game and doesn't have to compete for attention with other brands. Chapter 22, "Games and Advertising," reviews the state of the art in these areas and present some arguments for and against each of these strategies.

The life cycle at computer games development should attend the dynamism, the challenge and the opportunities of the game market. Business process management (BPM) pretends to give an alternative perspective of management to the departmental and hierarchical one. Game firm's business should be seen with an integrated attitude, incentivising employees from different departments to work together in the same process with a common mission and persecuting same objectives. The definition of a clear framework at the strategic level allows lower processes description and global business process architecture specification. Other important aspects of business process management approach at computer games industry should include ownership clarification, performance measurement mechanisms and obviously the identification and activation of improvement opportunities. Author elects business processes customization, integration of flows between firm and its supply chain partners and superior user interfaces using specialized workflow tools as being three improvement opportunities at games industry. In addition to those components, three additional extra concepts are considered critical to have a complete understanding of BPM. They are the conscious process management, the macro process management and the centrality of process. Chapter 23, "Business Process Management in the Computer Games Industry," follows these vectors in order to understand possible opportunities powered by BPM to gain competitive advantages in computer game industry.

Today's managers in the computer and video gaming industry are forced to reevaluate their companies' strategic position within the value-added chain, as traditional business models show a tendency to erode. While there are some striking parallels to the music industry, like facing the threat of acts of piracy, indicating what future developments might be expected, there are also best practice examples from the computer and video gaming industry to learn from. Thus, it is imperative to have a look at the changes in competitive settings within this industry and analyze adequate examples regarding how to setup new profitable business models. In order to evaluate the changed business models in a meaningful way a systematic approach is advisable. Therefore, a short ontology of business models is given first, supporting the illustration of recent developments in the industry and which will guide the presentation of selective cases. Three major implications for managers in the computer and video gaming industry will be identified in Chapter 24, "New Business Models for the Computer Gaming Industry: Selling an Adventure." These include a need to centralize the game experience, a stronger shift towards online distribution channels and the development of a collective sense of identity by target communities.

Two questions are examined in Chapter 25, "Pluralistic Coordination." Why is coordination hard to achieve when teams are diverse? Are there conditions under which players of MMOGs can learn skills of effective coordination and transfer these skills to real teams? A pluralistic network is a social system in which people are committed to working together effectively despite cultural differences. A core set of eight practices enables a network to be pluralistic. An experiment with the World of Warcraft game confirmed that the game can significantly accelerate learning of those practices. To enable the skills to be transferred to the real world, the game must be augmented with a reflective learning environment.

Virtual worlds enable new ways to create value. Recent examples from Second Life – a virtual world run by Linden Lab – have demonstrated how firms can use this technology to get in touch with customers and provide value to them. Chapter 26, "Business Opportunities in Social Virtual Worlds," aims at giving an overview of upcoming business opportunities in social virtual worlds. For this purpose, the

platform service offered by Linden Lab is analysed first. In the second step, the value creation potential is differentiated into four areas: 1. community-related business models which are comprised of the creation and maintenance of a social system with specific processes; 2. commerce business models which refer to initiation, negotiation and processing of transactions; 3. context business models which add value by supporting navigation and orientation; and finally, 4. content business models which refer to production and preparation of digital content such as avatars, virtual locations and artefacts. The business opportunities of each area are analysed with regard to case examples from Second Life. The chapter concludes with some business implications in order to help practitioners find their way into this new business medium.

Chapter 27, "How Has the Internet Evolved the Videogame Medium?" reviews and discusses the impact of mass adoption of the Internet and its assorted technologies is having on the evolution of the videogame medium. Specifically, the author reflects on how the Internet has enabled the creation of novel game platforms and types, triggered the improvement of game development process, expanded the game audience and increased innovation in game creation. Crucially, the Internet has transformed videogames into a massive socialization platform with far reaching consequences into society and economy.

The fifth section targets issues related to intellectual and property rights of computer games.

Digital technology has been stressing copyright traditional balance between rightholders' and users' interests. In fact, it allows the move from a mere passive consumption role to a player-as-producer model that potentiates the creation of user-generated transformative uses. Since, traditionally, copyright reserves full control over derivative works to the author of the original work, that branch of law may be (mis) used a tool for controlling users' speech. Chapter 28, "Computer Games and Intellectual Property Law: Derivative Works, Copyright and Copyleft," briefly studies the particular tension between the current copyright paradigm, based on the dichotomy active creator – passive consumer, and the control over creative transformative usages of digital works in the field of computer games, such as mods or add-ons, and exposes some reactions that go from voluntary licensing schemes, such as copyleft licenses, to compulsory licenses.

Chapter 29, "Law, Architecture, Gameplay, and Marketing," highlights areas of law pertaining to the development of computer games. It focuses on ways to manage legal risk and their impact on game architectures, gameplay, and marketing. It is intended as a practitioner's guide rather than a formal research study. In no case should you rely on this or any other publication in making legal decisions without consulting an attorney licensed to practice in your jurisdiction. Legal risk is the danger that when relevant laws are applied to a course of action, they will have negative or unforeseen consequences affecting one's rights and obligations. It can stem from uncertainties over what the law will be and how it might be applied. Since each possible course of action will raise multiple issues each of which could play out several different ways, one must consider all plausible permutations to develop a range of scenarios that can be ranked in a game theoretic sense by likelihood and severity of impact. This is the essence of legal analysis and planning, and as such it serves as the implicit basis for the organization of this chapter.

EXPECTATIONS

Among these 29 chapters, the reader is faced with the discussions and confirmation of the relevance and impact of this hot topic, providing professionals, researchers and scholars with some of the most advanced research developments, solutions and discussions of computer games as education and management tools as well as uses, trends, approaches, solutions and case studies. This book is expected to

support a professional audience of top managers and computer game professionals (developers and creators) and also an academic audience (teachers, researchers, and students, mainly of post-graduate studies). It can support disciplines of post-graduate studies on information systems and technologies related with computer games development under the design, psychology and management approaches.

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