

# IDGEI 2015 – 3<sup>rd</sup> International Workshop on Intelligent Digital Games for Empowerment and Inclusion

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## ABSTRACT

Digital Games for Empowerment and Inclusion have the potential to improve our society by preparing particular groups of people to meet social challenges in their everyday lives, and to do so in an enjoyable way through games. These games are developing rapidly to exploit new algorithms for computational intelligence supported by increasing availability of computing power to help analyze players' behavior, monitor their motivation and interest, and to adapt the progress of the games accordingly. The workshop on Intelligent Digital Games for Empowerment and Inclusion (IDGEI) explores the use of machine intelligence in serious digital games. In this context, we summarize the third international workshop on IDGEI held at the International Conference on Intelligent User Interfaces (IUI) 2015.

## Author Keywords

Machine Intelligence; Digital Games for Empowerment and Inclusion; Serious Games; Affective Computing.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

## INTRODUCTION

Digital Games for Empowerment and Inclusion possess the potential to change our society in a most positive way by preparing selected groups in a playful and fun way for their everyday life's social and special situations. Exemplary domains span as far as from children with Autism Spectrum Condition (ASC) to young adults preparing for their first job interviews, or migrants familiarizing with their new environment. The current generation of such games thereby increasingly demands for computational intelligence algorithms to help analyze players' behavior and monitor their motivation and interest to adapt game progress.

The development of such games not only requires expertise from the general gaming domain, but also particular understanding of a game's target domain, as well as

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technological savoir faire to provide intelligent analysis, interfaces and systems.

The first international workshop on Intelligent Digital Games for Empowerment and Inclusion, IDGEI 2013<sup>1</sup>, was held at the Conference on Foundations of Digital Games 2013 (FDG 2013), Chania, Greece, May 14, 2013, and aimed at bridging these communities and disciplines by inviting researchers and experts to elaborate the latest perspectives and findings in the field of IDGEI together.

The second international workshop, IDGEI 2014<sup>2</sup>, was held at the International Conference on Intelligent User Interfaces (IUI 2014), Haifa, Israel, February 24, 2014, and emphasized the focus of emotion recognition and human cognition in the frame of the IDGEI themes and the IUI community.

IDGEI's topics cover among others aspects of Machine Intelligence in Serious Games, Mobile and Real-World Serious Gaming, Emotion & Affect in Serious Games, Player Behavior and Attention Modeling, Player-Adaptation and Motivation, Novel Serious Games, and Human Factors & User Studies of Serious Games. In fact, it seems necessary to bring forth existing efforts and major accomplishments in the design of intelligent serious games, and to provide a forum for exchange in experience with intelligent serious games in practice, while encouraging the design of novel applications in context as diverse as health-oriented gaming, general learning and tutoring environments, or emergency preparation, and to focus on current trends and future directions in the field.

The international workshops on Intelligent Digital Games for Empowerment and Inclusion (IDGEI) [1,2] are aimed at bridging these communities and disciplines by inviting researchers and experts to elaborate the latest perspectives and findings in the field of IDGEI together.

The 3<sup>rd</sup> IDGEI 2015 was held at the ACM Conference on Intelligent User Interfaces, 29 March 2015, in Atlanta, GA, and targeted a broad audience of researchers and practitioners interested in cognitive system aspects of game interfaces and their impact on human behavior, in the context of social inclusion. The workshop aimed (i) to bring forth existing efforts and major accomplishments in the

<sup>1</sup> <http://idgei.fdg2013.org/>

<sup>2</sup> <http://idgei2014.joanneum.at/>

design of intelligent serious games, (ii) to provide a forum for exchange in experience with intelligent user interfaces and serious games in practice, (iii) while encouraging the design of novel applications in domains as diverse as health-oriented gaming, general learning and driving environments, or emergency preparation, and (iv) to focus on current trends and future directions in the field. It provided a specific focus on wearable miniaturized sensors that are becoming increasingly available for IDGEI applications.

#### **Workshop setup**

The IDGEI 2015 workshop included several keynote speeches by internationally acknowledged experts of various aspects of the field DGEI (Digital Games for Empowerment and Inclusion): The work of James C. Lester [6] (North Carolina State University, NC) on personalized learning ranges from game-based learning environments and intelligent tutoring systems to affective computing, computational models of narrative, and natural language tutorial dialogue. The research focus of James M. Rehg [7] (Georgia Institute of Technology, GA) is on developing methods for measuring, recognizing, and quantifying childrens' social and communicative behavior using video, audio, and wearable sensor data, as well as on computer vision aspects for future interfaces, such as egocentric video analysis using Google Glass. Alex Games [8] (Microsoft, WA; Michigan State University, MI) as leader in the Microsoft Learning and Engagement Program, manages the program of research and development of innovative learning and readiness UX using gaming mechanisms, including designs of social endorsement and learning incentive systems.

The keynote speeches were followed by the participants' oral presentations. The workshop hosted a technical demo-session that was particularly suited to convey advancement in the field of Digital Gaming. Finally, to foster discussion and actively involve attendees, a panel discussion involving the keynote speakers and selected experts was held.

#### **CONTRIBUTIONS**

The workshop presented the state-of-the-art in the field, focusing particularly on three main thematic aspects, as follows:

##### **Novel Intelligent Game Frameworks**

Novel game frameworks were investigated that focus on upcoming challenges. In the last decade, scenario-based serious-games have become a main tool for learning new skills and capabilities. The generation of scenarios can be facilitated and verified combining computer science techniques with the crowd. Recently, neuro- and psychophysiology based score measures were introduced, to measure actual value of demonstrated learning. Main effects related to biomarkers of vigilance and motivation

enable to predict learning and support interpretation of on-task learning styles [9].

##### **Emotion Recognition and Expression**

Affective computing is a key component in intelligent games for its relevance to transfer social cues, such as, to extract and display motivation and intention for game users. The workshop identified novel aspects in emotion recognition and expression that have a strong impact on game play, such as (i) the analysis of emotion in body gestures as input for high level decision making, (ii) advanced facial emotion recognition for mapping and manipulating facial emotion appearance in real-time, to assist in communication processes, (iii) the usage of speech analysis for identifying atypical affective cues; and (iv) the expression of different social attitudes to train the user in different situations that can occur in real life [14,15,16].

Complex interaction frameworks for inclusion games were described and discussed: (i) Automated emotion recognition by agents plays a major role in job interview simulation; (ii) serious games that assist children with Autism Spectrum Conditions (ASC) allow them to learn how emotions can be expressed and recognized via playing games

##### **Human Cognition and Context**

Intelligent game interfaces must be capable of representing and reasoning about the user's mental state, in order to react appropriately, for example on social cues that inform the system about his/her social attitude. The workshop studied novel methodologies for user modeling in the context of serious games for empowerment and inclusion. Formal models of Theory of Mind [4,5] were introduced in the context of human-agent interaction.

##### **Cultural Competency**

Cultural competency as a challenging aspect of human cognition was recognized as objective for game based learning approaches [10,11], with critical views on the assessment of their reach and impact. Attention is a crucial aspect of cognition in the context of mobile games. Novel methodologies enable to track the focus of users in natural mobile interaction, such as, in mixed reality games. Language learning is often at the core of games to attend to cultural differences [12,13].

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The workshop website <http://idgei2015.joanneum.at> and the conference management system were managed by JOANNEUM RESEARCH Forschungsgesellschaft mbH.

Communication such as comments and feedback about the event can be tracked in Twitter via #IDGEI2015.

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<sup>3</sup> <http://www.asc-inclusion.eu>

<sup>4</sup> <http://www.maseltov.eu>

<sup>5</sup> <http://www.tardis-project.eu>