A PROPOSAL TO CREATE A SPECIAL INTEREST GROUP ON COMPUTER GAMES (SIGGAME)

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Have comments on this proposal? Please send to the proposal editors:

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INTRODUCTION

We propose the creation of a new Special Interest Group (SIG) within the Association for Computing Machinery, focused on computer games (also known as video games, and digital games). The goal of the new SIGGAME is:

> *To foster, promote, and communicate high-quality research in the science, design, engineering, technology, educational applications, and culture of computer games.*

Any proposal to create a new SIG needs to address several issues. First and foremost, since the creation of a SIG is, in effect, a large stamp of approval for a new academic community, there needs to be some justification for the significance, and long-term prospects for this line of inquiry. Next, since several existing SIGs have focus areas that are of interest to games researchers, the unique, novel niche of SIGGAME needs to be established. Similarly, the relationship to other, existing SIGs must be explained, especially the proposed relationship with SIGGRAPH. Since there are other professional societies in the computer game space, their relationship to SIGGAME also needs to be detailed. Finally, pragmatic aspects of the new SIG need to be addressed, such as its proposed activities, and initial slate of officers. These issues are addressed in the sections below.

RESEARCH ON COMPUTER GAMES

Computer games are a new form of media, characterized by interactivity, complex rules and intricate real-time computer graphics. While some forms of new media do not give rise to academic communities—citizen's band radio, anyone?—those forms of new media that do create lasting academic communities share two properties: they are mass media, and they tell stories that allow us to reflect upon what it means to be human. The cinema is one such example, a new media that emerged in the early 20th century which has given birth to a robust community of scholars. Computer games have the ability to tell rich stories, and provide social commentary. In such disparate games as *SimCity*, which requires public transport systems to achieve large scale cities, *Civilization*, which provides a technology-driven view of the march of history, or *Grand Theft Auto: San Andreas* with its graphic representation of street crime, it is clear that games tell stories, as well as exhibit a kind of rhetoric based on the ideas baked into the underlying computational processes. Indeed, both cinema and games currently have research communities focused on exploring the sociological and humanistic elements of each media.

But, what about a technical research agenda? Computer games exhibit rapid technical advances in their underlying game engines, sophisticated artificial intelligence, use of computer graphics, and exploration of novel player input schemes. Rather than being limited to a single technical platform, games now run on portable and fixed game consoles, personal computers, cell phones, Flash on the Web, and via social networking sites such as Facebook. The fact that games are a form of computational media means there is tremendous power and flexibility in the underlying mechanisms of computer games, providing fertile grounds for further innovation. Due to this flexibility, games are expected to have a long, robust technical research agenda.

While technical research in computer games is a new and emerging research field, some areas of technical research within computer games have already become clear. Also emerging is the recognition that games research is multidisciplinary, and it is necessary to employ a broad set of disciplinary knowledge to make

forward progress on technical and non-technical research questions. Some important areas of research in computer games include (but are not limited to):

- *Richly interactive non-player characters*. For games to be able to tell stories, they must have computer-controlled characters that are able to interact with the player, express emotion, react in appropriate ways, and take effective action in the world. To do this effectively requires pushing the boundaries of natural language dialog systems (both recognition and generation), artificial intelligence (planning, case-based reasoning), event-based systems (to react to the world in a fluid way), and procedural animation (for emotion and movement in the world). The field of *path planning and navigation* has strong relevance here, as it focuses on the creation of algorithms that partition space and permit autonomous characters to navigate it in real time.
- *Procedural generation of game worlds.* Games now have the ability to take place in very large virtual spaces, ones so big that it is increasingly not economically viable to human author the entire space. Computational techniques for level design, character design, quest generation, background world history, and creation of game art assets are active research areas.
- *Interactive storytelling*. Since computer games give the player a high degree of agency in the world (they can move freely, and perform actions in any order they choose) it is challenging to present a story that has a coherent linear flow. Research on interactive storytelling involves developing representations of story structures that can be reasoned over, and planned from, to deliver a customized story experience to the player.
- *Novel interfaces*. The focus of this research area is exploring how new input and output devices can be used to create novel gameplay experiences, or games that provide additional benefits, as with the health gains of an exercise game.
- *Design of games, and game worlds*. Computer games are such a relatively new phenomenon that there is not established theoretical foundation for how to craft the spaces within which gameplay occurs. At present, level design and quest design is largely a craft activity, performed by people with a strong intuitive sense of how this is performed. There is much room for research that develops theories of level design, and for an empirical understanding of how people react to specific level geometries. There is also a vibrant research field focusing on the study of game design, broadly.
- *Education and games*. Since each new game involves a new rule system and game world, playing a game is inherently a learning activity. There has long been interest in harnessing this learning in games for teaching traditional school subjects. At present, there is not a well developed theory of how to craft a game experience to teach specific kinds of knowledge, beyond simple types of in-game skill and drill repetition. Game technologies can be motivational for learning computer science, and hence there is much interest in determining how best to integrate game technologies into computer science curricula.
- *Databases and games.* Massively multiplayer online games feature large numbers of simultaneous users interacting in a persistent virtual world. This leads to new demands on query processing and indexing to accommodate the high degree of churn and fast response times required by games. As well, data mining of persistently stored network game play sessions can drive improved game design.
- *Networking and games.* Increasingly, big-budget game titles include networked multiplayer play as a major selling feature. The key issue here is maintaining consistency of the game world for all players in the face of rapid movement and frequent interactions. This can involve dead reckoning techniques, and determining what items are in a player's line of sight so they can be updated first.
- *Game construction architectures and environments.* Current 3D computer games are typically built on top of a game engine, a framework that provides 3D model display and animation, collision detection, graphical effects, simple AI, level design tools, and more. It is still an open question as to how best to construct such game engines, and what are the key architectural tradeoffs. Similarly, it is an open research question as to how to provide game designers support, similar to that of CAD tools, for creating and reasoning about game designs.

- *Real-time computer graphics*. Compelling computer graphics are an important element in creating an engaging gameplay experience. Game graphics research focuses on creating graphical effects capable of execution in real-time on current graphics hardware, as well as techniques for animating game characters, performing lighting of game worlds, non-photorealistic rendering, and collision detection.

In addition to this, largely technical, research agenda, there has been considerable research attention on the player experience, the social and cultural aspects of gameplay, and cross-cultural analyses of games. Since games are a form of media, we feel it is important that the SIGGAME community embrace the non-technical study of computer games as well, since this interplay between the technical and non-technical viewpoints provides inspiration for both sides, and helps craft many aspects of the technical agenda. Furthermore, it is not just the case that technical and non-technical researchers just listen to each others' talks; some research is a fusion of both approaches. One example is a project that seeks answers to design and sociological questions concerning the game *World of Warcraft* by analyzing an online character repository. This research involves the creation of a data-mining infrastructure to gather and process this character data, pushing forward technical and non-technical agendas simultaneously.

From the above discussion, it is clear that research on computer games encompasses a broad range of issues, and draws upon many existing research disciplines. Computer game research is not just focused solely on computer graphics, artificial intelligence, human computer-interaction, education, databases, or networking. Instead, computer games research engages issues from *all* of these fields, by asking game-specific research questions that push existing fields in novel directions, directions that, in some cases, would not otherwise be explored by existing disciplines. For example, neither Software Engineering nor Computer-Human Interaction engage the design of physical spaces created by software, such as the levels in games. Yet, level design is a key design activity in the construction of game software. Since the focus of study in computer games research is a novel kind of computational media that delivers an engaging experience to a player, it is inherently multidisciplinary.

In summary, the field of computer games research is:

- *Broad*. There are many deep and engaging research issues in the field.
- *Multidisciplinary*. Games research spans a wide range of disciplines, and cannot usefully be viewed as a strict subset of a single existing research discipline.
- *Media focused*. The goal of the field is to create novel gameplay experiences, and hence understanding this experience requires technical and non-technical viewpoints.

RELATION TO EXISTING SIGS

Since digital games overlap with many core areas of computing, we expect and encourage collaboration with multiple SIGs. We note that the 2009 Foundations of Digital Games conference, expected to become the flagship conference of the new SIG, had in-cooperation sponsorship from five SIGs (SIGGRAPH, SIGART, SIGWEB, SIGCSE, and SIGMOD).

Before diving into a discussion of how SIGGAME will interact with specific SIGs, we want to tackle one issue head-on, the relationship with SIGGRAPH. To date, SIGGRAPH has done the most of any SIG to develop the computer games research area. From 2006-2008, it ran the Sandbox Symposium, a workshop co-located with the main SIGGRAPH conference that was focused on computer games research, and it 2009 it had a special games research track (distinct from the main conference proceedings) in the main SIGGRAPH 2009 conference. These have been positive, constructive steps towards creating a games research community.

We feel that creating a new SIG focused on computer games would lead to better outcomes than continuing to focus all computer games research inside ACM on SIGGRAPH. SIGGRAPH has its primary focus on computer graphics research, yet the list of research areas in computer games is much broader than this. In particular, there is a substantial artificial intelligence component to computer games research. We think it is extremely unlikely that SIGGRAPH focused game research venues will attract strong engagement from researchers who do AI/games, database/games, or networking/games research. This is due to the perception that papers will not receive informed peer review, and that a paper in the SIGGRAPH venues has, to date, not had the same prestige as a regular conference paper. The consequence is already evident in the area of

AI/games, with the AIIDE (AI for Interactive Digital Entertainment) conference showing how the community will fragment instead. Additionally, an examination of the papers published in the 2009 SIGGRAPH games track finds that there are no AI/games, database/games, or networking/games papers.

SIGGAME, by forming a new community, can be more welcoming to researchers from a broad range of research backgrounds. The 2009 Foundations of Digital Games (FDG 2009) conference acted as a proof of concept of this idea, brining together 250 attendees for a conference program that spanned artificial intelligence, game design, computer graphics, human computer interaction, game studies, and education and games. The conference program committee was carefully chosen to have leading researchers from all subareas of computer game research. The conference had 106 paper submissions, of which 30 were accepted, demonstrating that this formulation of the community was sufficiently trusted to attract many paper submissions and create a high-quality program.

Furthermore, we feel that many of the research topics in computer games have sufficient intellectual depth that they will lead to new research disciplines of their own. Some topics, such as interactive narrative, already have focused research conferences. As the research community grows, a SIGGAME would be best able to accommodate the emergence of these new research subfields. One example of this is the 2010 Foundations of Digital Games conference, which received 8 workshop proposals. Of these 6 were interesting and viable, and from these 3 were selected to be held at the conference (Intelligent Narrative Technologies III, Procedural Content Generation in Games, Teaching Aesthetics in Game Design).

Below we describe areas of overlap, and potential forms of interaction with existing SIGs:

SIGGRAPH: Ideally, we would like to see SIGGRAPH continue to engage computer games within the main SIGGRAPH conference. We feel this will naturally emphasize computer graphics and games research, as well as papers on innovative game design. This will permit core non-games graphics researchers to raise their awareness of games research issues, and vice-versa, games researchers will increase their awareness of cutting edge graphics techniques. We would also like to continue cooperation with SIGGRAPH in the Foundations of Digital Games conference. Additionally, we feel there is the potential for cooperation in developing future workshops and symposia in the area of procedural content generation, a topic of interest to both SIGGRAPH and SIGGAME. Co-location of Foundations of Digital Games with the SIGGRAPH conference is another possibility.

A robust SIGGAME would benefit SIGGRAPH in multiple ways. With increasing numbers of researchers focused on computer games, the number of people interested in and engaging computer graphics research topics will also increase, leading to more members of SIGGRAPH and attendees at SIGGRAPH conferences. Similarly, a SIGGAME will provide ACM another way to engage computer game professionals, also likely to increase interest in all game-related SIGs.

We now describe potential interactions with other existing SIGs.

SIGART: Artificial intelligence is a key foundational research area for computer games research, and hence we envision continued cooperation with SIGART in the FDG conference.

SIGCSE: Games for learning offer substantial promise for educators to engage young minds on difficult computer science (and other) topics. The Foundation of Digital Games conference grew from an earlier incarnation that focused on games for learning, and continues to have an education track. We wish to continue the tradition of SIGCSE cooperating in the FDG conference, and we envision educational uses of game technology continuing to be a substantial interest of SIGGAME members.

SIGWEB: Web based games, and social networking games are attracting large numbers of players and increasing investment. They offer the opportunity to collect a wide range of gameplay metrics, and hence quickly perform experiments to assess the impact of design changes on players. It seems natural to us to have SIGWEB continue its cooperation with the FDG conference, and we envision social networking game analysis will be a growing area of interest within the games research community.

SIGSOFT: Mainstream computer games have millions of lines of code. Learning how to manage this code is a challenge. Additionally, computer game reward structures may be a way to motivate developers to be proactive about the information revealed by software metrics. Co-sponsorship of a workshop exploring software engineering and games is one potential interaction.

SIGMOD: The workload and query speeds needed by games require new indexing and optimization approaches. Data mining game logs can improve game design.

SIGCAS: Games pose many social and ethical problems that are beginning to be addressed by the research community.

SIGCHI: Games bring nonstandard human-computer interfaces to the general public, with the success of platforms such as the Wii and games such as the Guitar Hero series. Additionally, computer games research often needs to use evaluation methods typically used by human computer interaction researchers.

SIGARCH: Today's game consoles have highly parallel multiprocessor architectures that challenge classical game programming paradigms.

SIGSIM: Computer games attempt to simulate reality in a new way: they mimic the natural world in a way that feels right but may not necessarily be mathematically accurate.

We note that, in many cases, the above paragraphs are just a sketch of potential interactions that SIGGAME could have with existing ACM SIGs. Undoubtedly, as existing SIGs learn more about SIGGAME (and vice-versa), more varied and detailed ideas for interaction will emerge.

RELATION TO OTHER PROFESSIONAL SOCIETIES

Other professional societies engage computer games as well. In this section, we describe these other societies, and explain why a SIGGAME has an important, novel role to play in this ecosystem.

International Game Developers Association (IGDA). The IGDA is an industry-focused society that emphasizes professional networking, and advocacy to the games industry. The IGDA does not itself run any conferences, instead focusing its efforts on activities at the yearly Game Developers Conference, a for-profit industry focused conference. IGDA does not have a research mission, and does not sponsor research.

IEEE Computational Intelligence Society Games Technical Committee. The IEEE CIS GTC focuses on the promotion of computer games research using computational intelligence techniques. As a consequence, it is not a broadly focused research community addressing all aspects of computer games, instead focusing on AI and games research. The group runs the well-regarded yearly Computational Intelligence and Games (CIG) conference, and was successful in launching the journal, IEEE Transactions on Computational Intelligence and AI in Games. We have been actively engaging this group, encouraging cross-participation in conferences, and ensuring that both communities have representation on the editorial board of IEEE TCIAIG.

Digital Games Research Association (DIGRA). The mission of DIGRA is to promote research in computer games broadly. In practice, this has meant a greater emphasis on game studies and game design research, rather than on technical research. The DIGRA conference is generally considered to be the top research conference for game studies and game design. If one imagines a line with technical games research on one end, and game studies research on the other end, the DIGRA conference aims to start from the game studies side and go a little bit over the middle into the technical side. The FDG conference aims to start on the technical side, and go a fair bit into the game studies and game design side. To the extent that this allows both FDG and DIGRA to appeal well to their core constituencies while still permitting cross-participation and engagement, FDG and DIGRA are complementary conferences, and DIGRA and SIGGAME are also complimentary.

Association for the Advancement of Artificial Intelligence (AAAI). AAAI sponsors the yearly AI for Interactive Digital Entertainment (AIIDE) conference series. AIIDE is the top venue for artificial intelligence focused research in computer games (as compared to FDG, which has a much broader mission as a big tent encompassing all technical and much non-technical research on computer games). People performing research on artificial intelligence in the area of computer games find both AIIDE and FDG to be valuable venues for publishing research. Even though researchers could submit a given piece of research to either conference, both AIIDE and FDG saw substantial increases in paper submissions this year, a sign that neither community is cannibalizing the other. Papers on AI and games represented about 25% of all paper submissions to FDG 2009. Due to this, and the active involvement of top AI/games researchers in the FDG community, we feel that AIIDE and FDG are both viable conferences.

Society for the Advancement of the Science of Digital Games (SASDG). SASDG is a California Public Benefit Nonprofit Corporation created for the express purpose to sponsor the yearly Foundations of Digital Games conference. The Board of Directors of SASDG has initiated this proposal to form SIGGAME. If this proposal is successful, SASDG will transfer ownership of the FDG conference to the new SIG. SASDG is 100% owner of the FDG conference.

Attached to this proposal is a letter approved by the Board of Directors of SASDG explicitly stating its intention that the FDG conference will be transferred to SIGGAME after its formation.

PROPOSED ACTIVITIES

The primary activity of the SIG will be the operation of the yearly Foundations of Digital Games (FDG) conference (http://www.foundationsofdigitalgames.org/). Over time, as new academic communities arise, we anticipate the SIG sponsoring and co-sponsoring other conferences in the computer games research space.

In May 2010 the Foundations of Digital Games conference will be held at the Asilomar Conference Center in Monterey, California. The General Chair is Ian Horswill (Dept. of Computer Science, Northwestern Univ., USA), and the Program Chair is Yusuf Pisan (Faculty of Engineering and Information Technology, Univ. of Technology, Sydney, Australia). We expect the 2011 conference will be held in Europe, in late Spring 2011.

SIGGAME also anticipates establishing scholarship programs to support graduate students who wish to attend the yearly FDG conference. It is also likely that SIGGAME will establish a distinguished paper award for high quality papers at the FDG conference.

The SIG will operate a web site, for the purpose of informing members about upcoming conferences and scholarship programs.

Ideally SIGGAME will be approved towards the end of the 2009/10 academic year, or the beginning of the 2010/11 academic year. In this case, we expect the FDG 2012 to be the first FDG conference under SIG leadership (this allows the FDG 2012 conference to go through a full planning cycle under the SIG). If approval comes prior to FDG 2011, this conference will be held in-cooperation with SIGGAME.

AUDIENCE FOR THE SIG

The primary audience of this SIG is the growing interdisciplinary body of university researchers and instructors who work in areas associated with video and computer games (including but not limited to game design, game development, game programming, and game studies), game industry professionals, and informed consumers. There is a growing body of game industry professionals who want deeper technical interchange than occurs at the yearly Game Developer's Conference, and would find that the FDG conference provides this.

INITIAL OFFICERS

The initial set of officers is proposed to be:

Chair: Ian Parberry (University of North Texas)

Vice Chair: Michael Young (North Carolina State University)

Secretary: T. L. Taylor (IT University of Copenhagen, Denmark)

Treasurer: Jim Whitehead (Univ. of California, Santa Cruz)

Ideally this set of officers will serve for a period of approximately one year, during the transition from the SASDG to ACM. These officers comprise almost all of the current board members of SASDG, thus ensuring continuity of leadership during the transition. Since the current board of SASDG is self-appointed (i.e., not elected), we think it best if SIGGAME officer elections are held one year after formation, thus ensuring the SIGGAME leadership will be those elected by the initial cohort of SIGGAME members.

In addition to the initial slate of officers, the following 14 people have also indicated that they would be interested and willing to serve as SIGGAME officers. These are all people who were asked, via email, if they would be willing to serve as an ACM SIGGAME officer within the next five years.

Rafael Bidarra (Delft Univ. of Technology, Netherlands)

Michael Nitsche (Georgia Institute of Technology)

G. Michael Youngblood (Univ. of North Carolina, Charlotte)

Mia Consalvo (Mass. Institute of Techology)

Tracy Fullerton (Univ. of Southern California)

Julian Togelius (IT Univ. of Copenhagen, Denmark)

Noah Wardrip-Fruin (Univ. of California, Santa Cruz)

Georgios Yannakakis (IT Univ. of Copenhagen)

Ken Stanley (Univ. of Central Florida)

Magy Seif El-Nasr (Simon Fraser Univ., Canada)

Marc Cavazza (Univ. of Teeside, UK)

Ana Paiva (Instituto Superior Técnico, Portugal)

Mark Riedl (Georgia Inst. Of Technology)

Nelson Zagalo (Univ. of Minho, Portugal)

INITIAL MEMBERSHIP

We have collected the names of 152 people who have indicated they would join an ACM SIGGAME once it is approved. These names were collected in two ways: in-person at a "future of the community" session at the FDG 2009 conference (32 names), as well as via online solicitation via mailing lists and game research related blogs and web sites. To be placed on this list, the person needed to proactively sign a sheet of paper (at FDG 2009) or send an email indicating their interest in joining the SIG once it is formed.

We note that 58 potential members are not currently members of ACM (or are lapsed members), indicating that SIGGAME has the potential to attract a new audience of people to the organization. 30 people did not indicate if they are members, and the remaining 64 are currently ACM or individual SIG members.

The complete list of names is attached to this proposal.

QUESTIONS

If you have any questions or concerns about this proposal, please contact Ian Parberry (*ian@unt.edu*) and Jim Whitehead (*ejw@cs.ucsc.edu*).

Society for the Advancement of the Science of Digital Games
203 Sunlit
Santa Cruz, CA 95060
www.sasdg.org

January 28, 2010

To Whom It May Concern:

The Society for the Advancement of the Science of Digital Games (SASDG) is a California-based nonprofit corporation established in 2008. The goal of SASDG is to promote and advance the science, technology, design, and study of digital games. The main activity of SASDG is the operation of the yearly Foundations of Digital Games (FDG) conference series, which is wholly owned by SASDG.

The Foundations of Digital Games conference series seeks to promote the exchange of information concerning the scientific foundations of digital games, technology used to develop digital games, and the study of digital games and their design, broadly construed. The conference is held yearly in late Spring or early Summer, and attracts an international audience of ~250 attendees. The focus of the conference is the presentation of papers describing novel research results. FDG is typically held in-cooperation with one or more special interest groups of the Association for Computing Machinery (ACM), and the proceedings of the conference from 2008 onward are archived in the ACM Digital Library.

The Board of Directors of SASDG feels that the mission of the organization can best be met in the long-term by the creation of a games-focused special interest group within ACM. Toward this end, the board has developed a proposal for the creation of a special interest group on computer games (SIGGAME).

With this letter the Board of Directors of SASDG expresses its firm commitment to transfer ownership of the Foundations of Digital Games conference to the new ACM SIGGAME, once it has been formed, to serve as the flagship technical conference of SIGGAME.

There are several issues relating to the transfer that are addressed below.

- After transfer to ACM, the planning authority for the FDG conference is expected to be under the sole control of the new ACM SIGGAME. This is typical of ACM SIG flagship conferences.

- For consistency of planning, SASDG will continue to operate the FDG conference for years 2010 and 2011. Planning and budget processes are well underway for these two years, and it would be disruptive to shift these over to ACM processes mid-stream. Hence, we foresee the first SIGGAME operated FDG conference being held in 2012. We anticipate that ACM SIGGAME will be an in-cooperation sponsor of FDG in 2011, and also in 2010 if approval occurs prior to the conference (June 19-21).

After the successful formation of SIGGAME and the transfer of FDG to it, SASDG will view its mission as being complete. At this time, we anticipate SASDG will dissolve, and transfer remaining assets to SIGGAME.

We feel there is tremendous potential in the creation of a special interest group focused on computer games, and we encourage the ACM to approve our SIGGAME proposal.

Sincerely,

Jim Whitehead
President and Chairman of the Board
Society for the Advancement of the Science of Digital Games