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The idea of using games or game design elements outside of the domain of games and play itself has been gaining traction in recent years. Often labelled as 'gamification' (Deterding, Dixon, Khaled, & Nacke, 2011) the use of game elements in the design of concrete products and applications has become quite popular. Additionally, researchers have been exploring how game design can inform fields such as educational and work practice, e.g. by exploring learning principles incorporated in well-designed games (e.g., risk taking, ordering of problems, and pleasant levels of frustration) (Gee, 2003). This special issue focuses on the use of games as a method or tool in human-computer interaction (HCI) research.

Literature on how to use games or game elements in HCI research is still rather scarce. Therefore, the editors of this special issue organised a one-day workshop at the 2016 CHI (Human Factors in Computing Systems) conference entitled "Game-based HCI Methods: Workshop on Playfully Engaging Users in Design" (Slegers et al., 2016). During this workshop, 12 researchers from different fields and the 4 organisers, discussed experiences on the use of game elements in their research activities. The contributions represented a diverse set of contemporary research related to the use of game-based methods in empirical research but also theoretical reflections and implications on how game-based methods may be used to engage users in design activities. Specifically, the workshop organizers and participants reflected on how and during which design stages they applied game elements and what positive game characteristics/qualities they aimed for. Starting from the individual insights, understandings, and perspectives of the workshop participants, an intense prototyping session in small groups was carried out to generate ideas on how game-based methods may be used within HCI research.

Based on these fruitful discussions, the organizers and participants of the workshop agreed to translate their common interest in the topic into future research activities. Being one of these activities, this special issue aims at illustrating bridging concepts and presenting methods for introducing the application of game elements and game design principles to research in the field of HCI. It focuses on how game design elements can be used to improve HCI research and how such elements can become part of the different phases within human-centred and participatory design. The concept of research games that is used in this special issue includes both complete games used in an HCI research setup as well as the use of single game design elements in research practice.

The Potential of Using Games in HCI Research

Using games in research is not new to the HCI domain. In the field of participatory design (PD), different types of design games have been used for decades (Brandt & Messeter, 2004), especially to facilitate issues that are central to the field, such as equality between design team members, mutual learning, and the political need to involve people in change and design processes. Our aim in this special issue is to open the floor for a lively and constructive debate on the opportunities and limitations of using games and game elements for research in the broader field of HCI (both fundamental and applied), and during the entire design and development process of technology-based products and applications.

The integration of game elements in HCI research methods may have several benefits. For instance, an important goal of HCI researchers is to make their research participants feel free to make mistakes (as these commonly reveal design flaws) and to critique a design. Games are considered environments in which it is safe to experiment (Gee, 2003). As such, games may provide inspiration for HCI researchers to create an environment that allows their participants to feel free to fail and to express themselves more freely. This can potentially prevent socially desirable responses and in that sense be beneficial for the quality of the whole research process.

Games may also be useful to facilitate social (group) processes (Muller, 2003) that are typical in HCI research. For instance, game elements may ease the unfamiliarity that is common in groups of participants who do not know each other yet, or reduce the role of individual participants who dominate group conversations in the research process.

Finally, and quite essential for research within the HCI domain, games may enable the introduction of future experiences in a playful manner. Since games usually involve (fictional) narratives (Mitgutsch & Alvarado, 2012), futuristic elements (such as new product or service concepts) that provide a glimpse at possible future user experiences may come across as less strange to research participants in a game setting. In addition, it is not uncommon for research participants to experience uneasiness while exploring future scenarios (which, for instance, is sometimes done by using enactment methods like role-playing). Game-based interactions may, in this respect, act as a design affordance that invites interaction exploration within certain boundaries.

Differentiating Research Games

In their taxonomy of serious games, Sawyer and Smith (2008) distinguished games for science and research - a category in which we can situate HCI research games - as a particular type of serious games. They see serious games as a re-application of games and game technology that, in this specific case, are put to use for research purposes (i.e. data collection, visualization and processing) and can be applied in various sectors such as non-profit and industry. In their view, this re-application can vary from developing a game for non-entertainment goals to repurposing commercial off the shelf games and appropriating particular game design techniques. Interestingly, in contrast with this broad interpretation of what ‘serious’ entails, Sawyer and Smith restricted the term games to software-based games. This special issue aims to move beyond such

restricted notions and understandings. In fact, overlooking the different contributions to this special issue, the reader will find both examples of digital and non-digital game-based approaches.

Rather than in positing a strict, exclusive definition of HCI research games, we see merit in exploring their variety. Establishing relevant dimensions and categories for research games may enable researchers to provide a more explicit description of what their game or game-based approach entails, to explore the design space and inspire new approaches, to investigate when a game-based approach is appropriate and effective, and which approach to adopt under the given circumstances. In this respect, we would like to point out a number of relevant differentiating aspects to consider.

As Schrier (2017) noted, we can use existing game typologies that make a distinction based on aspects such as genre, platform, and design principles or mechanics used (see for instance, Aarseth, Smedstad, & Sunnanå, 2003; Hunicke, LeBlanc, & Zubek, 2004), as well as research categorizations to differentiate and characterize research games. Scrutinizing the design of research games, for instance, is important as a coherent design that is in line with the research purpose is a prerequisite for reaching the desired impact (Mitgutsch & Alvarado, 2012). With regard to other research aspects, Schrier (2017) referred to matters such as the type of research question that is tackled, methodological approach, underlying epistemology and research discipline.

For research games that are intended to specifically explore a certain topic and gain new knowledge in a domain, which Schrier (2017) dubbed 'knowledge games', she proposes an additional classification. These games may (1) involve players in executing research-related tasks such as data collection, (2) encourage them to share their perspective or interpretation, (3) engage them in optimizing processes (or construct algorithms as Schrier puts it), or (4) use the information gathered about the players (e.g. play style) to make adaptations or predictions. This preliminary classification opens up the possibility space of what HCI research games may look like and achieve; however, it is also limiting in other respects. In particular, Schrier (2017) did not consider HCI research games in her work and defined knowledge games as "games that are created specifically to solve real-world research questions using crowdsourcing, collective intelligence and human computation techniques" (p.2). This appears to exclude HCI research games that involve a small-scale research set-up or the re-use of existing games.

In the case of HCI research games, we may also consider aspects typical to HCI practice, such as the design stage(s) to which the research is related. The ISO standard on human-centred design (ISO 9241-210:2010) for interactive systems roughly distinguishes the following activities in the iterative design process: understanding and specifying the context of use, specifying the user requirements, producing design solutions, and evaluating the design (International Organization for Standardization, 2015).

In a similar vein, the epistemological understanding of 'the participant' in the design process as subject or user, tester, informant, or design partner (Guha, Druin, & Fails, 2013; Sanders & Stappers, 2008) may also be a basis for categorizing HCI research games. Interesting in this regard is that research games by their nature also give participants a role in the game, as players or perhaps as game master or bystander. To what extent and how do these roles in the design process and the game relate to and influence each other?

Finally, we may look at how games as artefacts that involve technology (be it digital or otherwise) are framed in the HCI research process. McOmber (1999) derived three broad meanings given to technology in academic and popular discourses. Applying these to HCI research games, we may discover similar meanings appearing in how researchers present the game and advocate a game-based approach: (1) as a tool for HCI research (*technology-as-instrumentality*) (2) as something that reorganizes or revolutionizes HCI research practice (*technology-as-industrialization*), (3) as a novel, unique development in HCI research (*technology-as-novelty*). Also, the way games are framed during a research session or study seems relevant as this may influence both researchers' and participants' attitudes towards experiences with and usage of research games and their outcomes.

The Content of This Special Issue

Inspired by what was discussed above, we invite the reader to take a closer look at the articles contributed to this special issue, and see the diversity in how the authors approach HCI research games; how they draw from games, the function that games are given in research, and the HCI design stages they inform.

Wetzel, Bachour, and Flintham (2019) elaborate on the process of co-creating an online alternate reality game together with artists, which aimed to gain insights in how provenance is perceived, and may help to understand how a machine-readable format for provenance info can be displayed to people in a comprehensible way. Geerts et al. (2019) present three non-digital games they created for eliciting user needs and ideation purposes early in the design processes and discuss the structured approach they applied in designing and evaluating these research games. Finally, Gundry and Deterding (2019) identify the challenges posed by using games for data collection and how to deal with possible validity threats.

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Lizzy Bleumers is a user researcher at Thomas More University of Applied Sciences in Belgium, although when guest-editing this special issue she was affiliated with imec-SMIT-VUB. She has expertise in immersive and gaming experiences and her methodological skill set encompasses both know-how on setting up experiments and human-centred design methods. She is a member of the Flemish gaming association DiGRA Vlaanderen and member of this association's executive board. Related to this, she organized a series of Ludic City lectures on the mutual shaping between game-play and urban everyday life.

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