

# Activities to Support Sustainable Inclusive Game Design Processes

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## Abstract

**INTRODUCTION:** The problem addressed in this work is the lack of knowledge of what inclusive game design would mean in practice within existing design processes of game companies. A pilot project was devised to involve both the game industry and disabled people.

**OBJECTIVES:** The goal in this study was to identify activities that constitute the biggest obstacles to realising sustainable design processes for inclusive game design.

**METHODS:** The study is mainly based on two full-day workshops with the game industry and three game studios, three organisations of disabled youth and authorities.

**RESULTS:** Five activities were identified in the analysis of the workshops: 1) Find opportunities for inclusive game design; 2) Raise awareness about inclusive game design; 3) Handle integrity and security; 4) Recruit the right competence; and 5) Adapt workplaces and tools.

**CONCLUSION:** The five main activities should be considered to achieve sustainable inclusive game design processes.

**Keywords:** Game industry, Game design processes, Inclusion, Disabled people.

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## 1. Introduction

There are many research studies focusing on the creation of games that are accessible to disabled people. These studies have mainly been conducted in an academic context with no or little connection to the games industry, see e.g. [1]. This gap between research and industry is not unique to this particular area but is common in game research in general [2, 3]. There is also a lack of understanding with regards to the everyday life situation of people with special needs when designing for accessibility, as well as there is little consideration for the “real world situation” of the game developers [1, 4].

The pilot project presented in this article aims to bridge the gap between research, industry and end users. It

addresses inclusive game design with the explicit purpose to incorporate the perspectives of both the game industry and disabled people. To this end, representatives from the game industry and disability organisations were invited to participate in two consecutive workshops around inclusive and participatory design. As a result of these workshops, five activities to support sustainable inclusive game design processes were identified. The work was presented at the ArtsIT 2019 conference, but will here be expanded with new contributions of current related research in game accessibility, inclusive game design as well as related research about creating and maintaining user pools and game development processes. These are also discussed in detail, including one new activity in addition to four previously presented.

## 1.1. Game development

Game design, a central element in the development process, is a second order design problem [5]. A game designer defines the rules of the game but the goal of the design is the experience resulting from the gameplay that emerges from players' interaction with these rules and with each other. These characteristics of game design are captured well in the Mechanics, Dynamics and Aesthetics model proposed by Hunicke, LeBlanc, and Zubek [6]. The second order design problem gives implications to the game development process. A game design requires playtests to evaluate if the gameplay generates the desired aesthetics (i.e. experience). The focus on playtests implies a focus on playable prototypes [7] and this affects the process for all disciplines involved in the production, not only game designers. The process of developing games is hence different to both that of utilitarian software [8] and other media products, such as film [9]. The experience of a game is the result of a creative process that is a collaboration of a range of different disciplines:

*The sources of creativity as well as efficiency at [Company] rely on a subtle alchemy among communities of scriptwriters, game-designers, graphic artists, sound designers, software programmers and even testers. The team is important for the creative process. [10 p.591]*

Ideas are not only born within the team. There are many examples on how playtests and interaction with the player community contributes to ideation, e.g. [11, 12]. One important aspect of digital game development is the role of technology. Technology creates limitations and possibilities to the creative process in many different ways [7]. There are examples on how limitations and bugs have given rise to new creative gameplay [7]. The complex interplay between technology, creativity, and user experience makes game development projects complex to manage. Approaches from software development are not always applicable [13], not even those considered to be agile [14]. Change is inevitable [15] so bottom-up approaches are advised [16].

## 1.2. Game research

Research on games has seen a massive growth the last two decades. Despite this big academic interest, research on game production processes is still underrepresented. [3] There exists a gap between non-technical and technical research [17, 18] and very few game studies include empirics from the game industry [2]. The growth of the game industry has to a large extent happened without any strong interest from research on its inner processes. The deeply interdisciplinary collaboration that is a necessity for game production is not a necessity for game research. The disciplinary organisation of academia has led to a fragmented structure of game research. The *game study* community is dominated by researchers from

humanities and social science [18]. This community is generally focused on games as cultural expressions, the player, and the social implications of games and playing. Technical game research is disseminated in technically oriented venues under organisations such as ACM and IEEE [3]. This type of research is concerned with isolated technical components of games, such as graphical rendering, human-computer interaction, and artificial intelligence. The few studies of game production that have been conducted have mainly approached it from a management or software engineering perspective [19].

There are numerous examples of games that have been developed with a target to enable disabled people to play them (explained further in the related research section below). In spite of many successful such research projects, their implications to the game industry have been small. As discussed above, there is a general need to bridge the gap between academia and industry. This is also true for work within the specialised field of inclusive game design.

## 1.3. Inclusive game design and sustainability

Compared to universal design, “[i]nclusive design is a more pragmatic approach that argues that there will often be reasons (e.g. technical or financial) why total inclusion is unattainable” [20 p.105]. For inclusive game design, game rules further limit what can be done, as change of game rules essentially creates a new game. Furthermore, inclusive game design must also consider the aesthetics (the gaming experience) of the game and ensure that the experience is similar independently of whether the player has a disability or not.

There is a tendency among game developers to create games for people like themselves and the average game developer is a white, 35-year old heterosexual man without any disability [21]. One possible way forward when it comes to inclusive game design and development is to diversify the game development team in addition to forming focus groups that match the diversified target group. This could enable a participatory or co-design approach [20], involving disabled people as early as possible in the design process.

However, this in turn requires an in-depth analysis of what such involvement would mean in practice within existing design processes of game companies combining arts and technologies, related to strict schedules and budgets. Furthermore, Weststar argues that game developers have a project-based labour process and are part of an occupational community, dedicated “to the work, to the game, to the fans, and to the team” [22 p.1244]. This requires a continuous work for inclusion as workers may come and go rather frequently over time. Thus, there is a need to have a sustainable methodological approach that is possible for game companies to adopt and possible for disabled people to participate in. There is also an opportunity of learning from related research in other

industries; for instance, staff diversity does not imply an inclusive workplace where disabled people feel comfortable telling they are disabled [23].

Several previous studies such as [14] report on reluctance in the game industry to adhere to structured software development methods. This can be an indication that top-down approaches to inclusive game design may not be a successful route to take. However, the Communications and Video Accessibility Act (CVAA) in the USA, updated in 2010 [24] and fully implemented in January 2019, was successful in getting accessibility on the agenda in the game industry; while the CVAA focus on access to in-game communication [25], it has resulted in a much wider take on accessibility including controllers (e.g. Microsoft Xbox Adaptive Controller), screen reader support in the Unreal game engine [26] and much more. Prescriptive design guides that have been successful in other areas may not be successful in game development. The characteristics of game development needs to be considered in approaches aiming for inclusiveness. Creating game accessibility guidelines as a collaboration between industry and academia has been a successful approach, see [27].

#### 1.4. Problem, goal and method

The problem addressed in this work is the lack of knowledge of what inclusive game design (IGD) would mean in practice within existing design processes of game companies. The overarching purpose is to find a methodology (a system of methods) for how to design inclusive game design processes. The goal in this study is to identify activities that constitute the biggest obstacles to realising sustainable design processes for inclusive game design, from the perspectives of the game industry as well as from disabled people. To identify obstacles and thus enable an analysis of them, a pilot project (PowerUp) was defined by the authors. Two full-day workshops were conducted during 2018. The workshops included presentations and discussions with participants from all involved stakeholders, with notes taken by the authors. 13 persons from 11 organisations participated, ranging from three large game companies and a game industry organisation, to three organisations of visual, hearing and motor disabled youths, as well as a large game-oriented youth organisation, two universities and one other authority. The first workshop notes were structured in strengths, weaknesses, opportunities and threats, while the second workshop used unstructured notes by the authors. The workshop notes were then used as basis for several iterations of writing and discussions between the authors based on related research. One of the iterations was discussed with the game industry and youth organisations as basis for finding further project funding. Another iteration was presented at the ArtsIT 2019 conference for feedback from peer researchers. Two more presentations were made at the Nordic Game Conference, in 2018 and 2019 to get further input from the game industry.

## 2. Related research

Here two main categories of related research are presented. First, research on user pools in other fields of study is introduced as it is one possible way to involve end users in the design process. Second, current research in game accessibility is introduced both for awareness and context but also to illustrate the gap between research and the industry that need to be addressed.

### 2.1. User pools for inclusive game design

One opportunity for inclusive game design processes that was discussed during the PowerUp project, was to setup a database of disabled gamers willing to participate as testers and/or co-designers in the game development process. The idea of a database, or ‘user pool’, is not new as it has been explored previously in other areas. Dee and Hanson [28], report their experience from recruiting 800 elderly people with varying degrees and types of disabilities to a user pool for research studies during 2009 and 2015. They further present a set of guidelines of how to build and maintain such a pool of users. As gamers grow older (and the average age of gamers also increase) some of their findings may be directly applicable also for inclusive game design processes, while other findings may have to be adapted or excluded. For instance, they had to find out if some of the elderly people involved in their study had any experience with digital technologies, such as email or smartphones. This may not be the case with people who play games; if a person plays digital games it may be assumed that s/he has some basic digital literacy, unless someone else helps the player with e.g. buying, downloading, and installing the game. Dee and Hanson’s article (ibid.) also works as an introduction to researchers that are new to user-centred research, and stress the importance of building relationships, trust and empathy with the participants, as well as seeing them as participants to solve problems, not as part the problem itself that has to be ‘done to’ as they phrase it. In this sense, by building on their long-term experiences of building such as a user pool, this article expands on our own experiences from the two PowerUp workshops as an opportunity to solve part of the explicated problem here. It should further be noted that in 2019, AbleGamers in collaboration with the University of York launched ‘Player Panels’, a web-based community to which players with disabilities can register for participation in user-tests and research studies on games [29].

### 2.2. Inclusive game design research

To contextualize this study, a narrow selection of some of the latest research about game accessibility and inclusive game design is presented below.

One of the most well researched areas in game accessibility is visual disabilities, and this trend seems to continue. Recent contributions to this field of research

include *Musicraft* [30], a novel audio game concept for music creation where the soundtrack is the game itself. Furthermore, there is *SoniFight*, a free software under MIT licence to make fighting games accessible with a retrofit approach, including customisation of profiles and sounds for different games as well as screen reader support [31]. A prototype racing game was developed with an auditory display to explore how this genre of games can be equally accessible to blind gamers, by spatialized sound to indicate both the car's speed and trajectory as well as turns ahead [32]. *Frequency Missing* is a point-and-click adventure game developed for sighted and visually disabled people. In an evaluation it was shown that immersion between the two groups were similar except for control that was harder for visually disabled [33]. Urbanek [34] created a web-based game development tool for audio games, which also serves as a platform for building a community of audio game designers, with the goal to also learn how audio game designers work and adapt the editor accordingly. Another tool is an augmented reality app for blind people to create music using motion control or swipe as input [35]. Going further into the extended reality field, *SeeingVR* [36] is a set of tools for virtual reality (VR) that addresses some of the issues found on immersive technologies from visually disabled gamers in [37]. *SeeingVR* was developed by Microsoft researchers and is an exception that bridges the gap between industry and academia. Further research about inclusive design of virtual reality games, related to the seven pillars of universal design and six steps for inclusive game design, can be found in [38].

Recent research about hearing disabilities include for instance subtitling for deaf and hard of hearing people with an in-depth analysis of nine different games [39]. A recurrent note can be made about people with cognitive disabilities [40] which is still a group that get relatively little attention in game accessibility research and development. However, this seems to be improving to some extent, see e.g. [41] where learning analytics were applied to understand how players learn by analysing how they were actually playing. Finally, there is research about design of accessible games. One such example is participatory design with *SuperJam*, a game jam event to create new games with alternative controllers for people with severe motor disabilities [42].

In addition to research related to specific disabilities, there are also recent research examining available guidelines for HTML5 based games (using the canvas tag and WebGL) [43], comparing the gap between W3C WCAG [44] and Game Accessibility Guidelines [27]. Furthermore, there is a study that surveyed evaluation methods for game accessibility in existing literature [45]. Finally, there is very relevant research around community based, end-user development with a universally accessible game creation platform [46].

### 3. Results and analysis

The outcome of the two PowerUp workshops is here presented as a tentative framework of suggested activities that may be necessary to consider in inclusive game design (IGD) processes.

#### 3.1. Find opportunities for IGD

As have been pointed out, game development is a costly and complex process involving the collaboration between people from a broad field of competences ranging from technology to art. A participatory design approach will most likely mean that the current design processes will need to be changed. To identify and minimize the potentially negative consequences of these changes, it is critical that staff and management are involved from the beginning. Another important component is to create meeting spaces between game developers and disabled people; finding ways to make this as easy as possible given special needs and accessibility issues. In related research presented in [23] there are three phases towards inclusion at the workplace: organizational entry, integration and development activities. Entry concerns how to recruit testers and participants with disabilities, where both choice of channels and recruitment criteria matter; integration concerns socialisation; and development activities concern diversity education of staff in general, as well as competence training for disabled people. Recruitment channels today may be social media (that only reaches those who are able to and actually use social media), internal staff or reaching out to organizations of disabled people. Another option is to create or use a database for this purpose, such as AbleGamers Player Panels [29]. However, this may be less straight forward than what is needed as some of the following activities show.

#### 3.2. Raising awareness about IGD

Levy and Gandy [47] showed that a single one-hour undergraduate lecture was enough to impact understanding, empathy and awareness of game accessibility. Having educational activities within game companies or at industry events, could have a similar effect. For instance, the two workshops in the PowerUp project was useful to open up a discussion between game developers and organisations of disabled people, raising awareness of issues and opportunities. Another example is the *SuperJam* approach where disabled people were involved as experts [42]. Also, there is a possibility to train socially responsible engineers by developing accessible games [48], similar to SuperJam [42]. To get a general idea of what learning outcomes to cover in educational activities, an educational framework for game accessibility is available in [49, 50].

One related issue is how to handle reluctance in the game industry to adhere to structured software

development methods as previously described. For instance, when using heuristics it may reduce reluctance if the heuristics have been developed in collaboration between the industry and academia and have been applied in real game development before, such as the Game Accessibility Guidelines that also includes advice on how to apply them [27]. Game accessibility is not a smallest common denominator. On the contrary, game accessibility is a way to improve user experience for all as far as possible. This relates back to the discussion of inclusive game design earlier in this paper.

To further bridge the gap between industry and academia and help the game industry to take advantage of the latest advances in research, workshops could include presentations and solutions developed in research projects, such as those mentioned in the *Related research* section above. Also, to ease including such presentations and educational material, developing more open educational resources [51] could be a useful approach. Finally, the IGDA Game Accessibility Conference (#GAConf) provides free YouTube videos of presentations by both game developers and disabled people [52], that can be used in an academic context for students to learn from.

### 3.3. Handle integrity and security

Creating a network or database of players and developers with disabilities raise several ethical as well as legal issues that need to be resolved. There are for example limitations to what kind of data that can be stored, how, and for how long, given the new directives stated through the General Data Protection Regulation (GDPR) [53]. Furthermore, handling healthcare related data requires extra care. Communication channels must also be carefully managed for the same reasons, as a community may both help and harm (e.g. discriminate) disabled people. A possible approach is to involve and get help from authorities such as the Swedish Data Protection Authority (ibid.). However, a similar service may not be available in all countries or regions of the world. For smaller game studios without internal legal or human resource departments, some of these issues mentioned in this paper may be insurmountable without government support.

Furthermore, there are also internal studio policies, non-disclosure agreements (NDAs) and other similar restrictions specified by the companies that may become obstacles when it comes to sharing and storing data and other kinds of resources that can be of use for other developers working with inclusive design. Involvement of game studio management early on is probably necessary to overcome these obstacles.

### 3.4. Recruit competence among disabled people

Participatory inclusive game design requires recruiting disabled people that have the right competence. For a game development company, the most obvious solution would be to start searching among their own staff; according to [21] around 20% of game developers have some kind of disability. However, to recruit and/or identify experts within the organisation can be challenging and perhaps even ethically questionable, considering that disabilities along with for example gender, religious belief, ethnicity and sexuality are grounds for discrimination. Thus, even though the purpose of involving them in the process as early as possible is to make use of their expert knowledge, the question is how they can be found and then encouraged to step in as experts in a way that makes them feel comfortable. A possible suggestion is to create a new profession, quality assurance for accessibility, which may be a sustainable way over time to attract the right competence. They can then also function as ambassadors for accessibility and inclusion within the industry as part of the occupational community as described in [22].

When it comes to recruiting testers (in addition to designers), it is possible to contact the different organisations that gather people with a particular disability and ask them to spread the information among their members. However, there are some practical issues that need to be addressed. First, some forms of disabilities are very rare among the population, for example blindness, which means that these members can be widely spread geographically, making it difficult to, for example, set up test sessions. Second, their uniqueness makes them particularly attractive to recruit, but their uniqueness is also something that might make it difficult for them to decline participation. There is a risk that they feel trapped between feeling responsible for the group they represent, that is turned into a sense of guilt or even a lack of gratitude if they choose not to participate, and a feeling of being exploited or just exhausted by all the testing. This is because they most likely will be called for again have they participated once since it is so difficult to recruit them in the first place. Third, play tests are often an unpaid duty that players agree to do as they get to play an early version of the game, in so called beta tests, before all others, making play testing almost an exclusive privilege. However, play tests for inclusivity are very different, as they must include an evaluation of the game's accessibility in addition to regular gameplay tests. To identify potential problems in the design, these tests might need to be monitored by a usability expert, or evaluated by expert usability testers with the particular disability the design aims to support.

### 3.5. Adapt workplaces and tools

To facilitate participatory inclusive game design, the workplace needs to be accessible and support the use of assistive tools and technology. Having a consultant going through the office space and access to the building such as removing thresholds and need to use stairs, adding Braille to signs, or hearing-aid compatible systems and similar ergonomics is a possible first step. A second step may be to consider how documents, presentations and the company intranet are designed for equal access to information, where W3C WCAG [44] can provide guidance. A third step is to consider whether the tools used for game design and development raise barriers for access in the IGD process and how those barriers may be overcome. Opening a dialogue with tool developers (in-house or external) may be a necessity, and add tool accessibility as a requirement for the next game project. There has recently been a change in how tool developers addresses these issues, judging from a forum thread started by Unity staff [54] and Epic Games' experimental screen reader support in Unreal [26]. Another possibility is to use the GPII.net platform to make different digital technologies accessible using personal profiles, regardless of whether the person is using his/her own computer or not [55] that can be seen as accessible accessibility.

## 4. Discussion and future work

The goal of this study was to identify activities that constitute the biggest obstacles to realising sustainable design processes for inclusive game design (IGD). With the five activities that are grounded in the PowerUp workshops as point of departure, the following sections aim at wrapping up the study. Some of the theory in the introduction and related research sections have been touched upon directly in the description of activities. Below, theory is used to discuss how these activities relate to the overarching purpose of finding a methodology, or a systematic way, to learn how to design inclusive game design processes. Finally, some projections of possible future work are made.

### 4.1. Designing IGD processes

While game design is a second order design problem [5], designing inclusive game design processes is also a meta-level problem; perhaps it could be called a third order design problem. In other words, designing inclusive game design processes (third order) only indirectly affects game design (second order) that in turn only indirectly affects the user experience (first order). Designing game design processes to be more inclusive, does not mean that game designs have to change; instead it merely enables a diversity of user perspectives on game designs to avoid unnecessary barriers to be built into games. However, removing barriers to access may enable a disabled person

to play, but it does not necessarily mean that the person enjoys the gameplay experience more. It is crucial that the game is not only functional but also fun (or interesting) [12], i.e. (in the context of this study) not only accessible but also inclusive. Furthermore, it is likely that an inclusive game design process has a better chance at both removing barriers and creating better play experiences for inclusion of more people, compared to processes that do not consider inclusion from the outset. Thus, the creative units or communities of specialists [10] such as programmers and artists, need to have knowledge and skills about inclusive game design and accessibility. This in turn requires education, where useful advice can be found in [47-50]. Educational activities should also consider the occupational community [22] structure of the game industry where staff works on a project basis, for instance with a pool of open educational resources [51] that can be freely shared within the industry rather than in-house resources. An important part may be to develop a common taxonomy for inclusive game design processes, so that knowledge can be coordinated and shared efficiently, see e.g. [11]. To make game design processes more inclusive, the five activities in this paper and perhaps also other activities yet to be found may be necessary to consider.

### 4.2. Diversifying game development teams

Similar to the need for methodology in playtesting game experiences with prototypes [7], there is a need to find a methodology for designing inclusive game design processes. The methodology needs to be pragmatic in line with the definition of inclusive design [20] and may be a contribution to the lack of research on game production processes [3]. While some knowledge can be gathered from development of utilitarian software or other media products, there are also differences [8, 9] such as challenges to meet expectations of artistic vision and novelty [13]. These expectations may be in conflict with requirements for universal access, but within the more pragmatic concept of "inclusive design" there may be an opportunity for novel user experiences for all. It could even contribute to the artistic vision. Further challenges different from software development in general is that even agile methods are not fully applicable [14] and a more evolutionary approach of constant change is necessary [15]. This requires bottom-up approaches with early testing throughout the production life cycle [16]. Participatory co-design takes this to the next level, where involving disabled people not only as testers but also as designers becomes a necessity for achieving inclusive, fun and accessible games. Another difference is that game production management has to consider both software engineering as well as creativity [19]. All features of inclusive game design need both solid engineering to make the game fully functional for increased accessibility, and creativity to make the functionality meaningful or

inclusive, so the end product gives the intended (interesting) experience to those who can play it.

Relating to the five activities in this study, adapting workplaces or handling integrity and security can certainly be learnt from other fields than games, but many tools for game development (e.g. game engines and editors) differ from more generic office software. For instance, there is a lack of standards in the game industry where each game platform or engine have their own de facto standards, compared to e.g. the web where browsers are built to work with third party applications such as screen readers. This creates different challenges for accessibility [43]. While this is changing for games made with e.g. Unity [54] or Unreal [26] engines, access to the game editing tools is still a challenge for including (some groups of) disabled people in development teams. Furthermore, when it comes to recruiting disabled people with the right competence also in other industries, there may be problems where employers do not ask to avoid stigmatization and employees may be afraid to tell they are disabled [23]. In other words, if this can be solved within the game industry, it may be something for other industries to learn from. Based upon discussions during the second PowerUp workshop there are companies outside of the game industry that have specialised on hiring disabled people; however, according to one of the involved youth organisations, it often means that they are underpaid and was thus not considered a good approach. It is also important to not hire disabled people on basis of their disabilities as a form of quota; there must be a focus on competence while diversifying the staff to find opportunities to enable more inclusive game design.

Improving representation of disabled people in game design requires a participatory or co-design approach [20], involving disabled people as early as possible in the design process. However, this in turn requires an in-depth analysis of what such involvement would mean in practice within existing design processes to minimize the need for change. The five activities in this study can be used as a starting point for such analysis: reaching out to and involving existing disabled staff, while respecting their integrity and safety, as well as adapting the workplace and tools and thus enable recruiting people regardless of being disabled or not. In other words, by removing barriers in the environment, both technical and social, disabled people may feel more comfortable in working at game companies and contributing to making games more inclusive.

### 4.3. Bridging gaps

Three gaps were identified in related research: 1) between research and industry [2, 3]; 2) between non-technical and technical research [17, 18]; and 3) between accessibility designers and disabled users (in understanding). The first gap is unfortunate in general as both game researchers and game developers could benefit by having close collaborations. The second gap may lead

to research that ignores dimensions that are essential in applied game development. The third gap could also be seen in the PowerUp workshops. Thanks to the PowerUp project the authors believe that a breakthrough in this field has been made at least locally in Sweden, where game developers met disabled youths from three organisations representing vision, hearing and motor disabilities. This may seem like a small step but it had not been done before (to the best of our knowledge) within the involved game companies. The companies were three of the ten largest companies in Sweden. Hopefully this paper may help to bridge these gaps.

### 4.3. Future work

The tentative five activities above will hopefully spark a fruitful discussion with game developers, organisations of disabled people and researchers. This may then be used as basis for further workshops and activities outlined in this paper together with game companies and organisations to enable sustainable inclusive game design processes. These activities may include interviewing game designers, programmers and artists with and without disabilities, that could result in a better understanding of how inclusion of disabled people can be improved in production pipelines.

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