



New frontiers in futures games: leveraging game sector developments

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ARTICLE INFO

Keywords:

Games
Foresight
Futures
Experiential Futures
Co-design
Game sector

ABSTRACT

In the last decade, games have grown into a dominant and highly diverse form of media, characterized by a number of transformations in the game sector that offer new opportunities for games in a futures context. These developments include changes in the cultural presence, the production and dissemination of games, which in turn have led to changes in their content and forms. This paper investigates to what extent such game sector developments have been utilized by games in a futures context, and building on this analysis, where the key opportunities are to leverage game sector developments to advance the field of futures games. Connections are made between game sector developments on the one hand and alternate reality games, massively multiplayer games, experiential futures games, online video games, game design engines and game jams on the other. Key recommendations resulting from this analysis include researching new player bases, adapting existing games, blurring the lines between commercial games and futures games, developing new futures games design and dissemination infrastructure, integrating futures games and present action, and organizing new funding mechanisms for futures games.

1. Introduction

Interest among futures practitioners and researchers in the use of games has increased over the last decades, building on an already well-developed history of simulation and gaming as a foresight method (Bishop, 2011; Mayer, Zhou, Keijser, & Abspoel, 2014; Valkering, van der Brugge, Offermans, Haasnoot, & Vreugdenhil, 2013). The domain of games is highly diverse, and as a result, the potential for games as an approach to futures is multi-dimensional (Vervoort, Kok, van Lammeren, & Veldkamp, 2010). A good way to begin to understand this potential is to compare games to other futures methods. Like system models, many games are essentially dynamic system representations that can be used to explore interactions/feedbacks between system elements, providing insights and recommendations for action (Alessi & Kopainsky, 2015). Like future scenarios, games allow for experientially powerful explorations of future worlds in a narrative mode (Vervoort et al., 2010). Games, however, also offer unique benefits. Many types of games approach game worlds through the roles of player -and non-player characters. These characters have their own goals, limitations, societal positions, character traits, and more – offering those engaging with games unique opportunities to see future worlds and systems from a subjective point of view (Rumore, Schenk, & Susskind, 2016; Vervoort, Rutting et al., 2012). This focus on actor perspectives is often combined with a level of interactivity with a game's world, systems, rules and incentives that is unmatched by other forms of media (Vervoort, Kok, Beers, Van Lammeren, & Janssen, 2012, 2014a; Vervoort et al., 2010).

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<https://doi.org/10.1016/j.futures.2018.10.005>

Received 18 July 2017; Received in revised form 8 August 2018; Accepted 13 October 2018

Available online 15 October 2018

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While games in the context of futures have a long history (Mayer, 2009), the commercial game sector has been changing profoundly over the last decade in many ways that offer new opportunities for games in a futures context. Some of these opportunities are beginning to be utilized by futures games; others are still waiting to be explored further.

The objective of this paper is to investigate the radical changes that have characterized the recent development of the game sector, and discuss how these changes could be leveraged in the field of futures. The paper takes an explicit visioning approach, exploring and investigating possibilities based on the analysis of the commercial game sector with the aim to inspire futures practitioners as well as game designers. Many of the trends discussed apply mainly to digital games, the largest market – but I will discuss other game types (board games, live role playing games) as well, since these types are highly relevant to gaming in futures, and these platforms are arguably used more often than purely digital games (Milojević, 2017).

For the point of departure for the paper's main analysis (after a brief contextualization of futures games in the remainder of this section), I focus on major developments in the commercial gaming sector that have happened over the last decade or so. Each of these developments is first described, with developments building on each other (Section 2). Then, in Section 3, I will investigate to what these developments connect to the most recent work in futures games. Building on this comparison, the paper discusses gaps and opportunities to utilize game sector developments to push the frontiers of futures games (Section 4).

1.1. A brief history of games in futures work

Games have a long history in the context of futures. Much of this history falls within the space of using games for strategy and planning – where the use of games arguably stretches back millennia. Mayer (2009) offers a very helpful overview of the history of games used in policy and planning contexts. Mayer describes the turn from war gaming to policy gaming outside of the military domain as having started in the 1960s, with waves of innovation, stabilization and decline, co-developing with work in decision science, operations research and systems analysis. Researchers and policymakers began to realize the limits of the predictive capacity of quantitative modelling, especially when it was used for complex social problems. Such realizations led to an interest in simulation gaming as a way to combine computer projections and human agency and choice. Simulation gaming in a planning context developed in parallel and sometimes in combination with scenario approaches. Organizations such as the RAND Corporation experimented both with rigid games where rules were pre-determined, and free-form games where rules and roles could be adjusted during play. However, skepticism arose about the foundations of simulation gaming as a rigorous, predictively powerful approach to projection and planning in a positivist framework. Free-form gaming seemed to yield more relevant insights to policy makers, but was harder to validate consistently and robustly in terms of positivist research framing (Brewer, 1978).

Over time, appreciation grew among researchers and policy makers for the complexity of interconnected human and natural systems, and for the highly culturally embedded, subjective, messy nature of processes of governance. This, and the problems with the opaque 'black box' nature of highly complicated computer-based games, caused a move toward simpler, transparent, parsimonious models with more of a focus on actor interactions that were easily integrated into new generations of policy and foresight games (Meadows, 1999). The use of soft systems techniques and conceptual modelling underpinned such applications (Checkland, 1999; Meadows & Robinson, 2002). Processes for developing these games placed much more emphasis on the ability to adapt and make games case-specific. Combinations of participatory modelling or 'companion modelling' and games have grown into a vibrant field (Abrami et al., 2012; Alessi & Kopainsky, 2015), both related to system dynamic models and agent-based models (le Page, Becu, Bommel, & Bousquet, 2012; Smajgl, Ward, Foran, Dore, & Larson, 2015). More constructivist frameworks were used to understand the value of these new approaches to game creation and play (Mayer, 2009).

As game and computing technologies have developed, digital games have started to offer better possibilities for public engagement, both in terms of scale and accessibility through on-line applications, and in terms of offering experiential (visual, auditory, interactive) engagement with potential futures (Devisch, 2008; Shaw et al., 2009; Vervoort et al., 2010). At the same time, interest among policy makers in finding new ways to enable public participation grew (de Caluwé, Geurts, & Kleinlugtenbelt, 2012; Geurts, Duke, & Vermeulen, 2007; Mayer, 2009). The new opportunities offered by games have therefore often been used to engage publics in spatial planning processes, climate adaptation exercises and other planning/strategic activities (Bendor, 2012; Bishop, 2011; Grund & Meier, 2016; Haas Lyons, Walsh, Aleman, & Robinson, 2014; Hassan, 2017).

The use of games in futures practice and research is currently expanding and diversifying rapidly. Many of the wider-ranging examples are directly or at least partly relevant to the game sector trends discussed below, but in general, games with a futures approach range from large-scale online games (Dunagan, 2012), games that integrate game play with real or non-game digital environments (Writerguy, 2007), board games and card games (Bontoux, Bengtsson, Rosa, & Sweeney, 2016; Candy, 2018), live playing games (Inayatullah, 2013), games that combine play and modelling (Alessi & Kopainsky, 2015) and various hybrids of these categories (Wu & Lee, 2015). An important recent turn has been the broadening of approaches to games from what I would characterize as 'foresight games' – games aimed at testing systems and strategic planning (Dannenberg & Fischer, 2017) - to 'futures games' – games used to engage with futures with more diverse objectives, such as experiential and embodied engagement through performing and inhabiting futures, enhancing imaginative capacities, and more (Candy, 2010b; Milojević, 2017). This futures work builds on a desire to engage productively with the notion that futures, presents and pasts are multiple, and socially constructed, and that enacting futures opens up and shapes present worlds (Vervoort, Bendor, Kelliher, Strik, & Helfgott, 2015). Live action role playing, theatre and other non-digital game formats are predominantly used, though there are important digital examples as well.

1.2. Evaluating the benefits of games for futures work

With the growing use of games in futures, there is an increasing need to understand and evaluate their benefits. The evidence is a mix of anecdotes from practice supported increasingly by more robust research. Inayatullah (2017) reflects on practice to say that games have proven to be an effective tool for generating plurality and diverse futures. Dator and Gaming (2017) states that ‘games are the closest we can come to actually doing politics repeatedly, and to pre-experiencing alternative futures’. Taking a broader societal perspective, Dannenberg and Fischer (2017) bring Huizinga’s assertion that social structures – functions which they use to understand scenario planning as well. In a policy context, Geurts et al. (2007) formulate the relevance of games as ‘5 C’s: complexity, communication, creativity, consensus, and commitment to action’. The goals of foresight games used in a policy context are typically a mix of these ‘C’s’: increased understanding of complex systems for players, an elicitation of stakeholder needs and interests for researchers and policy makers, an increased understanding of and empathy with other actor positions, and ability to collaborate, and the identification of shared actions that can be taken.

Evidence on the ability of foresight games to elicit stakeholder views and to act as ‘safe spaces’ that stimulate understanding, empathy, and collaborative action is becoming more robust (Rumore et al., 2016). Players of futures games aimed at reflexivity regarding futures report an opening of their future possibility spaces and greater understanding of their own biases and perspectives on futures (REF). Measuring the impacts of the use of games as a way to understand complex systems is more complicated, because of difficulties of representing the newly gained knowledge in relation to the games that players interacted with (Alessi & Kopainsky, 2015). Despite this, there is also evidence of impacts of games on both the technical understanding of system dynamics as well as of policy processes (Rumore et al., 2016). Such findings can be contextualized in broader research on the positive impacts of (commercial) games on cognitive and social abilities (Granic, Lobel, & Engels, 2014) within limits of healthy engagement.

1.3. Tackling the challenges of the futures field?

To ensure that my assessment of the links, gaps and new possibilities between the commercial game sector and games for foresight and futures is useful for futures practitioners and researchers, I want to reflect, in particular, on several challenges that the field of futures currently wrestles with, and discuss how the new possibilities for futures games identified in this paper can contribute to overcoming these challenges:

- 1) Up-scaling the enactment of futures: as mentioned, futures practices are quickly diversifying and embracing the need for embodied engagement with and enactment of diverse futures (Bendor et al., 2015; Bhatti, Selin, Ramirez, & Chermack, 2015; Candy & Dunagan, 2017; Candy, 2010a; Dunne & Raby, 2013; Vervoort, Keuskamp et al., 2014). New approaches for true participation and co-design of futures are also emerging. A remaining challenge, however, is to do this at scale, both for more specific purposes and questions, and for the creation of broader societal futures literacy (Candy, 2018; Payo, Becker, Otto, Vervoort, & Kingsborough, 2015; Vervoort, Kok et al., 2012). Often, when communicated to larger audiences, futures are still mostly expressed using narratives or other more non-interactive media, offering few possibilities for those engaging with these futures to explore and contribute, let alone create entirely new sets of futures, determined by their own rules, for others to explore (Bennett et al., 2016; Jasanoff, 2015; Vervoort et al., 2010; Wilkinson & Eidinow, 2008).
- 2) Integration of futures and action (Vervoort & Gupta, 2018). Many in the futures field still struggle with effectively integrating explorations of the future with present day action. Examples exist mostly at the level of government policy, organizational strategy, and community planning (Bourgeois et al., 2012; Vervoort, Thornton et al., 2014). Futures work is emerging that explicitly attempts to map the contribution of futures practices to transformative change (Hebinck, Vervoort, Hebinck, Rutting, & Galli, 2018; Patterson et al., 2017). But scalable approaches that allow people all across societies to engage with the future in a way that is relevant to their present practices and experiences are still rare.

2. Analysis: connecting trends in the game sector to practices and challenges in the field of futures

Here I will investigate a number of key transformative trends and developments in the game sector. Based on this investigation, in Section 3 we will discuss 1) to which these developments are already being utilized in the futures field and where the gaps are; 2) provide recommendations for how these developments might be utilized to help overcome current challenges for futures research and practice, and to provide new, unforeseen opportunities. The trends describe build on each other, and are discussed in that order.

Analyses of the commercial game sector are only partly engaged with in research literature – and therefore, this examination is supported by business writing on the sector. I will also use salient examples of games and other software/tools for each trend, choosing examples that have particular relevance for futures work.

2.1. Development 1: games as a dominant form of media

The role and prominence of games in the wider global cultural landscape has changed and is still changing rapidly and significantly. Newzoo, a leading provider of market intelligence about the game sector, reports a number of key trends in its 2016 overview report (Newzoo, 2016). After a period of slower growth from 1994 (20.8 billion USD revenue globally) to 2004 (25.4 billion USD) (ESA, 2004), the game industry’s revenue in 2016 is 99.6 billion USD, more than twice as high as the global movie box office revenue at 38.3 billion USD. Projected global growth up to 2019 is 6.6%. 58% of the growth of the industry comes from the Asia-

Pacific region. For the first year ever in 2016, mobile gaming is expected to account for more revenues than PC gaming – 37% of revenues now comes from mobile gaming. This follows the fact that in global regions such as sub-Saharan Africa, ownership of mobile phones is much more widespread than ownerships of PCs/laptops or consoles.

Overall, 2 billion people worldwide are currently playing digital games, and the number is growing quickly (Newzoo, 2017). 44 percent of the world's online population plays games. 29% of players are 18–35; 27% are below the age of 18; 26% are above the age of 50; the remaining 18% are between 36 and 49. 42% of game players are women – and women over the age of 18 account for a greater proportion of the total population of game players than boys who are 18 or younger. A 2016 ESA survey (ESA, 2016) shows that when asked which forms of media provide the most value for money, 47% of respondents – the largest group, chose video games. The primary motivations for people to get involved in games are the play itself, watching others play, and creating new content, with sharing, communication and trading as secondary motivations.

Notable is that the growth of video games has been connected to a rebirth of the board and card game industry as well – global board game sales almost doubled in sales from 2011, amounting to 9.6 billion USD (Hudak, 2016). Physical games and computer games are increasingly crossing over. For instance, a board game version of the popular dark fantasy action role playing video game *Dark Souls* received 5.4 million USD in kickstarter funding, making it the 12th highest kickstarter-funded project ever (mcWhertor, 2016). Collectible card games markets are supported by online versions of cards and more board games include digital apps to support play.

Finally, it is important to note that the growth of the game sector is not only associated with a growth in players/consumers, but also of people with skills to develop games (around 220.000 people are working in the game sector in the United States alone (Siwek, 2017), and of game development education, to support the growing market.

2.2. Development 2: production - game engines, resources and tools, game jams

The increased capabilities of the hardware (personal computers, consoles) for video games meant that high-profile games that aimed to use these computer capabilities to the fullest extent to create ever more detailed, complex and realistic games required larger and larger teams and budgets. However, at the same time, a different trend emerged to complement these big-budget 'AAA' games.

From the mid-2000s, an exponential increase in the development of independent or 'indie' games, developed and often funded and published by small teams or even individuals, occurred (Garda & Grabarczyk, 2016). This rise of indie games happened mainly because of increased possibilities for game production (discussed here) and dissemination (see the next section). Game development software such as *GameMaker* (YoYo Games, 2017) and the more widely used and advanced community-supported *Unity* (Unity Technologies, 2017) created an environment in which game developers have many tools and resources available for their games, instead of having to build everything from the ground up, decreasing the time needed to build games, and decreasing the programming expertise required as well. There are niche tools like *RPG Maker* (for role playing games (Owens, 2011)) and *Twine* (for text-based adventures, (Friedhoff, 2013)) that offer even more ready-made tools for specific genres. Internet communities also offer a broad base for sharing knowledge about game design, and can offer positive social learning experiences in the process (Freeman, 2016). Another element that played a role to make indie games viable is crowdfunding (Diver, 2016; Garda & Grabarczyk, 2016).

One of the earliest highly commercially successful examples of an 'indie' game which could be of interest to futures researchers, is *Braid* (Number None, 2008), in which the effects of time change with each level to create original puzzles – in which time flows forward in some aspects, backwards in others; time moves only when you move; and so on. A more recent example is the game *Undertale* (Fox, 2015), built in *GameMaker* by one individual, Toby Fox, with only 50.000 US dollars in kickstarter funding. The game's emotionally engaging, bait-and-switch storyline can result in many different ending scenarios. *Undertale* sold over 2 million copies from September 2015 up to December 2016 – almost as much as the most popular big team/high budget titles from the same year (Steam Spy, 2017). Models for game development keep being experimented with, also in terms of company organization and structure. The Dutch Game Garden hosts 40+ startup game studios in one building, interacting with each other in various ways (Garden, 2018); the successful game *Dead Cells* was developed by Motion Twin, a French game developer structured like a workers cooperative (Motion Twin, 2017).

The decreased threshold to getting involved in game development has greatly facilitated the quick prototyping and development of games. One particular activity that has been boosted has been the 'game jam' (Eberhardt, 2016; Farhan & Kocher, 2016; Fowler et al., 2016), an intense format where in several days (and often nights) new or existing teams of people work together to create working game prototypes – often including a prize for the best games. Game jams are often voluntary, involving students and starting game designers driven by an interest in learning, extending portfolios, and collaborating with others. The annual Global Game Jam works with a different theme each year and has grown from 1650 participants in 2009 to 42.812 participants in 2018 (Global Game Jam, 2018) building games in locations all around the world in the same couple of days.

2.3. Development 3: dissemination – dedicated platforms

A driving force in making 'indie' games flourish has been the emergence of fundamentally new ways to disseminate games offered by the internet. Even in the early 1990s, early successes based on free 'shareware' versions of full games such as *Doom* (Id Software, 1993) shared on online bulletin boards can be identified. However, from the early 2000s on, online platforms such as *Steam* (Valve, 2003) and its equivalent services for consoles and mobile devices started to allow for the online purchasing of digital copies of all games available for a given platform, making the threshold of getting games into a physical format and distributed through physical

stores a thing of the past. The low cost of game dissemination means that games do not have to be as clearly commercially viable to be published – the main investment becomes the time of a small team or an individual (Diver, 2016). This low threshold for game development allows game developers to experiment much more with original game designs if they are willing to put in the time – which in itself is reduced because of game development software. Platforms like *Steam* also have impacts on the game design process – because mechanisms like early access allow for prototype or beta versions of games to be released early to publics who can give their feedback (Banks, 2012). The ease of online game dissemination also connects to crowdfunding projects as a mode of funding (Diver, 2016). In addition, genre and interest-specific platforms such as *Good Old Games (GOG)* (GOG.com, 2018) offer more of a focus to buyers. An example that focuses on the ‘smallest’ independent game projects, up to small prototypes, is *Itch.io* (Corcoran, 2013). Here, the threshold for games getting published is very low, and many games on the platform are free. As a result, *Itch.io* is an important platform for the distribution of game jam prototypes and student projects.

2.4. Development 4: complicated pleasures - diversification of game content and topical focus

The low cost of experimentation made possible by new ways to develop, fund and disseminate games has allowed game developers to create games that can buck the mainstream trend of what games have traditionally offered in terms of substance, which can be summarized, in a very simplified fashion, as a ‘fun’ empowerment fantasy. Game developers have been experimenting successfully with games that offer more challenging, disconcerting, ambiguous and emotionally resonant experiences (Dunne & Raby, 2001, 2013; Rusch, 2016). Games like this have become successful with players looking for something beyond the familiar, and these successful examples stimulate a further broadening of the vocabulary of experiences and ideas in the world of game development. Independently developed games have also become spaces for inquiry into broader social and political issues. *Spec Ops: The Line* (Yager Development, 2012) is at once a story about Post Traumatic Stress Disorder, a critique of Western military discourse and interventions, a treatment of Joseph Conrad’s *Heart of Darkness*, and a critique of the escapism of violent video games. Other examples include games by Molleindustria, developer of ‘activist games’. Molleindustria’s games such as *The McDonalds Videogame* (Molleindustria, 2006) aim to confront and challenge players about the problematic practices of major industries. In the highly popular and critically acclaimed *Papers, Please* (3909 LLC, 2013), the player plays a border control officer in a fictional dystopia. There is an incentive in the game to dehumanize people crossing the border in order to make ends meet at home – exploring conflicts created by changing institutional constraints and their interplay with personal needs. *Democracy 3* (Positech Games, 2013) gives the player the political leadership of a country of choice, offering a multidimensional political and policy simulator with a strong realpolitik discourse. The game *Tyranny* (Obsidian Entertainment, 2016) is a role playing game where the player steps in the shoes of one of the lieutenants of an oppressing military force, and has to deal with warring factions while choosing to attempt to mitigate, as best as possible, the worst evils of the regime from a position of power, or to embrace tyranny. Significantly, the world of serious games is also broadening its categories of what is considered to be a social impact game: leading organization Games for Change (Games for Change, 2018) has mentioned and/or awarded games such as *This War of Mine* (about surviving as a civilian in a Bosnia-like conflict (111 Bit Studios, 2014), *Never Alone* (a game culturally embedded in stories of the Iñupiat people (Upper One Games, 2014) and *Life is Strange* (a game that plays with time travel between different scenarios of personal action and its consequences (Dontnod Interactive, 2015)).

Beyond this topical focus, games also experiment with how subjectivity relates to time and the links between past, present and future. *Nier: Automata*’s (Platinum Games, 2017) existential story about artificial intelligence futures unfolds in different layers through different game playthroughs. Some independent games focus their reflections more squarely on complicating how games structure and simplify their worlds. *The Stanley Parable* (Galactic Cafe, 2013) is a game full of absurd humor that constantly subverts the player’s expectations about what a game should be, by offering no clear objectives and revolving around a narrator who engages directly with the player in an ironic fashion, commenting on the arbitrary nature of game objectives and conventions. Such subversive, expressive, challenging games are not necessarily long, involved experiences (Case, 2016).

2.5. Development 5: games as spaces for creating and sharing content

The wider accessibility and feasibility of game development coincides with increasing possibilities for players to modify existing games, or even create new content in games. The history of games that allow players to create new content for them goes back decades, with milestones such as *Id Software* making it very easy for players to create their own *Doom* levels and modifications or ‘mods’ (Id Software, 1993). Mods offer a bridge to full-blown game design for many aspiring designers; and a number of mods have served as the first versions of what have later become standalone games, such as *Dear Esther* (Thechineseroom, 2012) and *The Stanley Parable* (Cafe, 2013). While mods usually require some technical expertise, many games have had level and campaign editors to allow players to create their own content for games; in some games, like *Minecraft* (Mojang, 2011), the game play itself revolves mainly around creating new content – sometimes extraordinary building projects – as the basic play. *Minecraft*, developed by a small team, has sold 122 million copies as of February 2017 (Blake, 2017), and its focus on creation has led to its use in many educational and research settings (Nebel, Schneider, & Rey, 2016). *The Magic Circle* similarly plays with game conventions by getting players involved in re-programming an ostensibly unfinished game (Question, 2015).

2.6. Development 6: new possibilities for immersion and presence offered by VR

A large part of immersion in games stems from active player engagement with the game, imagination applied to the game

experience, and identification with player characters (McMahan, 2003). The key tools for this immersion have been available in games since the day of tabletop roleplaying games – emotionally involving narratives, character customizability and meaningful player choices. However, a specific aspect of immersion, the sense of physical presence, can benefit from recent developments in virtual reality (VR) technology, because it can create presence through visuals, realistically responding to body movements, and through creating experiences of movement (Diemer, Alpers, Peperkorn, Shiban, & Mühlberger, 2015). Virtual reality has been hailed as next year's technology for decades, but from 2015 to 2017, VR gained a significant if still moderate market presence for the first time (Newzoo, 2016). High-end VR systems for personal computers such as the Oculus Rift and the HTC Vive were released, that combine VR graphics with VR controls and limited possibilities for bodily moving around VR environments. Sony released its PS VR for the PlayStation 4 in 2016 as well, offering a less powerful system but with a larger database of high quality applications. Games with futures theming like *Eagle Flight* (Eidos Montreal, 2016), a game in which the player plays an eagle living in a future scenario of Paris, are emerging on these platforms. At the same time, much cheaper alternatives exist beyond these high-end VR systems. There are products that work by inserting a mobile phone into a set of goggles which is empty except for VR lenses. Such products are available for around 10 US dollars as of 2017.

2.7. Development 7: games and life - augmented reality

A development that has happened in parallel and in connection to virtual reality is the proliferation of Augmented Reality (AR) (Billinghurst, Clark, & Lee, 2014), a term for the digital augmentation of reality, for instance by adding digital graphics to live camera footage (such as the camera of a mobile phone) of real objects or environments, and/or overlaying maps used for live navigation with visualization. Research on AR in a serious gaming context has a long history, but recent developments in the commercial gaming sector open up new possibilities. Two games have been the most visible examples of this: *Ingress* (Niantic, 2013) and its 'spiritual successor' *Pokémon Go* (Niantic, 2016). *Ingress* is a game in which two sides (aliens vs. resistance) battle for the control of 'portals' which are located on important landmarks on a real world map. *Ingress* developed a player base of millions of players worldwide. Players walk long distances to increase their scores and overtake portals. Events in specific cities are organized that draw players from all around the world (Karpashevich, Hornecker, Dankwa, Hanafy, & Fietkau, 2016). *Pokémon Go*, building on *Ingress* infrastructure, quickly developed a player base that eclipsed Twitter users worldwide for a total of 28.5 million players online globally at the same time (Althoff, White, & Horvitz, 2016). The successes of *Ingress* and *Pokémon Go* in particular have quickly accelerated commercial and research interest in AR (Althoff et al., 2016; Oleksy & Wnuk, 2017), and it can be expected that commercial AR games will develop rapidly into a more populated and diverse genre.

2.8. Development 8: secondary communication and storytelling

One aspect that complements how the internet functions as a way to co-construct, fund and disseminate games is its role as a medium for game-based communication and storytelling. Individuals who play games and record their playthroughs on YouTube are some of the most-viewed content creators on the platform, with the highest having 56 million subscribers as of mid 2017 (Youtube LLC, 2017b). Professional game players also use Twitch, a live game streaming service where viewers can pay the streamers (Jia, Shen, Epema, & Iosup, 2016). This means that content created about video games can have much wider audiences than the games themselves. After its release in 1998, the in-depth strategy game *Starcraft* (Blizzard Entertainment, 1998) became a national pastime in South Korea, with matches between pro players being held in sports arenas and broadcasted on national television (Jia et al., 2016). YouTube is also used for storytelling about game worlds, and some games are particularly well suited for such community storytelling. For instance, the game *Dark Souls* (From Software, 2011) and its related titles create worlds that invite interpretation and storytelling because they offer their information in an almost archaeological fashion, through short fragments of descriptions about events and characters connected to objects all around the game world. Some YouTube content creators focusing on storytelling around one game like *Dark Souls* receive professional-level revenue from high numbers of subscribers (Youtube LLC, 2017a).

3. Emerging connections between game sector developments and futures games

Here, I investigate which developments in the use of games in the field of futures can be connected to the above developments in the commercial game sector, and where gaps and opportunities are, with a specific view of tackling the challenges spelled out in section x.

3.1. Large scale on-line games with participatory content generation: alternate reality games, massively multiplayer online games

This genre of games and game-like approaches can be seen as the subset of futures games that connects to more of the commercial game sector's developments than any others. In the 2000s, the Institute for the Future created a series of games that all shared a focus on providing structures for collective futures storytelling with large online groups of thousands of players. These projects, most prominently *World Without Oil* (Writerguy, 2007), *Superstruct* (McGonigal, 2008), and *Urgent Evoke* (Waddington, 2013), could be characterized as collective scenario exercises with light game-like structures supporting them. They had, to greater or smaller degrees, Alternate Reality Game elements as well – in that the games added a make-believe layer to players' realities where they imagined themselves to be in different future scenarios. A system with some overlaps but a stronger focus on structured scenario exploration was the *Foresight Engine* (Dunagan, 2012), a system of incentives and structuring questions where people would present

ideas about desirable futures in Twitter-length text and interact with each others' ideas in appreciative, critical and other ways. This system has been applied a number of times for specific national and local futures questions, often resulting in the participation of thousands of players. A more recent game, *Fort McMoney* by Dufresne (2013), combined such communal content creation with several other elements, including simulation modelling of a city's economy and other systems, and community decision making on policy direction. Focusing on the erstwhile oil boomtown Fort McMurray in Canada, the game combines the above aspects with another element – interactive documentary material. Players needed to interact with the stories of real people in Fort McMurray to gather enough knowledge points to participate in communal city policy making.

While there are still only a few examples in this category, these games connect with a number of the discussed commercial game sector trends. These games aimed to scale up their player bases (development 1); dissemination happens online (development 3); the games offer framing narratives that are complex and challenging (development 4); crucially, they allow for the co-designing of content (development 5); in cases like *World Without Oil*, they encourage people to enact the game in their actual reality, making them effectively augmented reality games (trend 7); and they focus their content co-creation on secondary storytelling through blogs, twitter, videos and more (development 8).

3.2. Live experiential futures games

A second broad category of futures games that is highly relevant in this analysis is the family or community of games related to live experiential futures (Milojević, 2017). Part of this category consists of live role playing games where players enact and embody different futures as different characters, such as the *Sarkar Game* (Inayatullah, 2013) alternative future scenarios with role playing components such as those conducted by Candy and Dunagan (2017), Candy (2010a), Dator (2009), and games crossing over into theatre (Baena, 2017). Other games, like the *Polak Game* (Hayward & Candy, 2017), focus on self-reflexivity about attitudes regarding the future. The *Thing from the Future* (Candy, 2018) focuses on simple prompts that players combine into makeshift futures in which they imagine objects and artifacts from that future. Another set of games focuses on new ideas through recombination but does this by using 'seeds' of the future, in the form of transformative niche practices, to help imagine desirable Anthropocene futures (Bennett et al., 2016; Laura et al., 2018; Pereira, Hichert, Hamann, Preiser, & Biggs, 2018). The *Sustainability in an Imaginary World* project focused on people engaging with their deeply held beliefs about sustainability and future worlds while being encouraged to engage in their own meaning-making (Bendor, Maggs, Peake, Robinson, & Williams, 2017). Though different in terms of methods and specific objectives, what such games have in common is an interest in experiential and embodied futures. Because such games are conducted live, they can be seen as connecting with only a few of the mentioned developments in this paper. These games mostly align with developments 4 (challenging content), 5 (co-creation of content), and, to some degree, 8 (secondary storytelling). However, these games have much to offer when they are considered in combination with the other game sector developments. Furthermore, there is a fruitful branch of futures games development that overlaps with participatory modelling, and is not visibly aligned with experiential futures games but shares interests in role-playing and shared future making (Abrami et al., 2012; Alessi & Kopainsky, 2015). Finally, games combining the benefits of live role-playing and the ability of digital games to calculate important system information for players have emerged in particular in the context of climate change gaming and land use scenarios (le Page et al., 2012; Paul, 2018; Sterman et al., 2012).

3.3. Adaptations of commercial games

A category of futures games applications that is nascent but highly promising is the adaptation of existing commercial games for the exploration of futures. Educational expansions of *Sim City* and *Minecraft* have been created (Elliott, 2015); there is a sustainability-focused expansion for *Sim City* grandchild *Cities: Skylines* (Colossal Order, 2017). Such expansions build very strongly on the popularity of the commercial game sector (development 1) and use its existing dissemination (development 3) to scale, while adapting a type of game that allows for a lot of freedom in generating content (development 5). Another significant example is the adaptation of the aforementioned *Minecraft* to digitally enact different futures. One example of this is the creation of an adaptation city in collaboration with the Guardian (Stuart, 2015). An example with a particular societal impact has been the digital replication of the last European lowland forest in Poland which was under threat to be cut down (Richardson, 2018). This adaptation of *Minecraft* ultimately led to the saving of the forest with the help of a well-known Polish *Minecraft* player live streaming his interactions to restore the forest, adding a case of the influence of secondary storytelling (development 8) to the mix of utilized developments.

3.4. Single player games

In terms of digital games, the most populated form of game relevant to foresight, especially in a broad sustainability context, remains the single player video game – either played online or through an installation on a PC or mobile device. Many such games exist, and they can mainly be seen as building on development 1 – the increasing visibility and growth of games as a genre of media (Games for Change, 2018; Red Redemption, 2011; Wu & Lee, 2015). Some of these games have been able to achieve large-scale player bases, for instance, the older project *Climate Challenge* developed by Red Redemption together with the BBC where you engage in global climate change governance, was played 500 thousand times in the first week of release alone (Red Redemption, 2007). Though such single player games do little to tackle the outlined challenges of the up-scaled co-creation of futures and their use for real-world problems, they do provide many examples of how future worlds can be captured in game systems.

3.5. Game jams with a futures focus

While the other categories mentioned above are more established, the organization of game jams to develop not one game but a range of games that each represent different future worlds is just emerging, and I am drawing mostly from my own experience as someone involved in this specific direction. The EU-funded TRANSMANGO project on the future of food in Europe organized a series of game jams across Europe with food and futures experts, practitioners and game designers, that led to 150+ different game prototypes, some physical and many digital, with each game exploring different food futures. Game prototypes resulted from processes that take several days to several months. These games are disseminated online as well as experimented with and analysed for the futures they enact (Ballard, Hrehovcsik, & Vervoort, 2018). Several game jams were also conducted to take on future environmental governance challenges in the context of the Earth System Governance project (Vervoort, 2016). Game jams can be used to generate VR futures as well. At a series of ‘VR hackathon’ events, ‘The *Anthronaut Experience*’ organized by Future Earth as part of the side activities of the 2015 Paris climate change conference to experiment with new ways to make Anthropocene futures experientially available (de Grosbois, 2016; Future Earth, 2017). Using game jams as a way to develop many futures games is highly promising because it can potentially harness all game sector trends to help explore ways to engage with the main challenges of the futures field – up-scaled experiential co-design of futures and connections from futures to practice and action.

3.6. Futures-specific game design engines

Finally, game engines can be designed specifically to facilitate the development of futures games, building directly on game sector development 2. For example, The *Tygron Engine* (Tygron, 2017) is a flexible engine that allows for the adaptation and construction of area-specific, multi-player games and scenarios about planning, land use and natural resource management, drawing from multi-dimensional location-specific geographic data and biophysical and economic relationships. Game development time customized to a scenario process can be conducted by one trained researcher in a few months to a few days, depending on the depth of the game and the level of adaptation needed to create a new setting.

4. Discussion: links, gaps and next steps between futures games and the game sector

So far, this paper has mapped out important developments in the global gaming sector, and connected those developments to current frontier work on futures games. Here, I will discuss the links, gaps and next steps for futures games as they relate to each mentioned game sector development – building up lines of research and action that run across multiple developments in the process. Some of what I propose here is ambitious, and time and resource-intensive – and I will therefore dedicate a final section to how such ideas could be realized financially and organizationally.

4.1. Recommendation 1: understand the new potential players of futures games

The fact that there is a larger, more diverse and more globally widespread player base for games than ever implies that this familiarity with the medium could result in a lower threshold for individuals and groups to use games as a way to experiment with the future (Squire, 2005). Mayer (2009) signaled the proliferation of ‘digital natives’ who have grown up with digital technology, but in the years since his publication, the proliferation of games as a medium has happened for long enough to have consequences for working with policy makers (in the widest sense): many of the current and upcoming generation of policy makers, executives and civil society leaders are more likely to have previous experience with games and may be active game players in some form. To contextualize new applications of futures games, researching experience and relationships with games among professionals who might engage with futures work would be very valuable.

4.2. Recommendation 2: use the structuring of futures from current frontier practice in a digital context

This paper’s efforts to connect game sector developments to current developments in futures gaming has highlighted the strong and diverse efforts to develop more experiential, embodied enactments of futures. However, because most of these processes depend on live facilitation, their scale of application as a contribution to societal futures literacy can be seen as a challenge that leveraging the commercial game sector’s developments could help address (though it is important to note that accessible card games like *Thing from the Future* have their own scaling potential as well). Conversely, the conceptual learning from experiential futures can provide a powerful guide for the development of digital games for futures exploration with large-scale audiences – and the mentioned Alternate Reality Games and Massively Multiplayer Online games offer early examples of this that can be built upon.

4.3. Recommendation 3: adapt commercial games and support their adaptability for futures gaming

The adaptation of highly popular games that already benefit from all the game sector developments mentioned (including appealing to millions of players (1), easy accessibility (3), and having a strong secondary storytelling movement (8)) has great potential. *Minecraft* is a particularly great example because of its being on player expression through the development of new environments and worlds (development 5). Developers of futures games could engage with this potential at two levels: one, by actively searching out games that offer contexts and tools for the exploration of new futures through modification, and secondly, by engaging game

developers and finding ways to incentivize open design that allows for modification that is relevant to futures in the first place.

4.4. Recommendation 4: blur the lines between commercial games and futures games

At the same time, the increased interest among independent developers in themes and subjects that have social and political relevance is blurring the lines between commercial games and ‘serious’ games. While games exploring social and political themes often do so very much on their own terms and without targeted educational or political objectives, their more associative and expressive approaches to such subjects may turn out to be very effective in increasing futures literacy. However, while games are tackling increasingly challenging and diverse subject matter, the representation of diverse futures is still relatively lacking, with dystopias of various types like *Fallout* (Obsidian Entertainment, 2010) or *Deus Ex* (Eidos Montreal, 2016) dominating. Games can be said to have an important cultural influence on shared social imaginaries (Jasanoff, 2015) that are available and engaged with. Therefore, it matters what future worlds populate the game sector at large. Futures researchers and practitioners can engage more directly with the gaming sector to explore how the industry can engage with future worlds and themes beyond its current scope. Futures experts could engage game developers in scenario creation activities, for instance at game developer conferences, or through game development educational programs. A point of comparison for this effort could be taken from the largely successful efforts to increase cultural and gender diversity in games (Deen, Nack, & Haggis, 2015; Simons, 2016).

4.5. Recommendation 5: futures-oriented resources for game development

With the proliferation of games as a medium also comes a growing population of students and professionals in game design. The significant increases in accessibility of game design in general should be built upon to facilitate the development of futures games. This can be done, first of all, by simply making greater use of existing game engines and development environments such as *Unity*. As a next step, specific off-the-shelf resources and assets could be developed for open access environments like *Unity*, based on experience with structuring and enacting futures, to help game designers build futures games. Since *Unity* also works as a tool for VR scenario development, this recommendation covers VR resources as well. More genre-specific game development engines like *RPGMaker* (focused on role playing games) and *Twine* (focused on text adventures) could be used or adapted as well (Friedhoff, 2013; Owens, 2011). Beyond this, specific game design environments could be made for the development of futures games. The aforementioned *Tygron Engine* (Tygron, 2017) is a rather advanced example of this, but *RPGMaker* and *Twine* can actually serve as models for more accessible and simple game structuring tools. The development of such tools and resources can, in turn, be used effectively by leveraging rapid game prototyping processes such as game jams – and several examples of specific futures game jams have already been mentioned in the previous Section 3. In such co-design processes including many different societal perspectives, different games can represent desirable and/or challenging future worlds that are fundamentally different from present worlds (Vervoort et al., 2015). If many game co-design processes are initiated independently, game worlds can emerge that are fundamentally different in terms of scope, key elements, values and concerns.

4.6. Recommendation 6: use dissemination platforms for futures gaming

So far, other than the fact that serious games including futures games can be found online, searches on the game dissemination platforms that help independent developers spread their games provide little evidence that games in the futures space have made use of us platforms. If futures games developers are interested in reaching broader player bases with their games, investigating how to get these games online on existing platforms like *Steam*, *Itch.io* or, for instance in the case of tabletop role playing games, on digital market *DrivethruRPG* (DrivethruRPG.com, 2018) is a good start. However, futures games could also be hosted on more dedicated platforms where games are organized and described based on futures characteristics and categories. Other features of current dissemination systems, like early access, allow for players to interact with games still under development, allowing for an iterative process between game designers/futures researchers and prospective players.

4.7. Recommendation 7: integrate games and action

A key challenge for futures work in general which goes for the use of futures games as well is the need to connect the exploration of futures with present day action. The integration of futures methods into specific policy and planning processes can help ensure that there is a trackable effect on planning, and following this, effects on present day actions can be monitored (Vervoort, Thornton et al., 2014). However, in this paper we have also discussed many opportunities for futures games to contribute to wider societal futures literacy. While such futures literacy could be measured, the effects on present day action are bound to be more dispersed. First of all, research is needed that investigates how games add to social imaginaries is needed that identifies how such changes in turn lead to behavior change. Secondly, more direct effects of futures games that seek to increase futures literacy in broad societal context can be measured. Importantly, direct action coming out of communities associated with such games can be tracked – the example of the Minecraft adaptation of the Polish forest comes to mind.

In terms of game design for societal futures literacy, the integration real life behavior change into games has high potential. *World Without Oil* encouraged people to take real actions and live out its future scenario; more such Augmented Reality approaches can be imagined that encourage people to, for instance, experiment with desired futures or seek out and share ‘seeds’ of the future (Bennett et al., 2016) and ‘real Utopias’ (Wright, 2010) in their present day contexts.

When we do consider the use of futures games for more concrete/specified problems and policy questions, a core recommendation becomes adaptability games and game-related tools. The *Foresight Engine* (Dunagan, 2012) and game engines like *Tygron* (Tygron, 2017) are good examples of futures game resources that each have a portfolio of successful use cases. Just like with other futures methods, such use cases can be leveraged to attract more opportunities for application. Similarly, if a game jam results in many different game prototypes, encouraging and keeping track of the applications of specific games to specific use cases can help build interest in rapid game prototyping as well as provide reflections on the game jam process and methodology. When futures games are used to engage with high specific policy or governance questions, the game design process itself can be so valuable that it can be the main tool to characterize problems and actor roles and to structure solutions, with the resulting game being a side product (Alessi & Kopainsky, 2015). A largely unexplored area is the use of Augmented Reality approaches to create on-going feedbacks between game play and policy practices.

4.8. Recommendation 8: organizing the funding landscape

A number of the recommendations made in this section are actually relatively easily realizable for those interested in futures games. Adaptations of existing games are potentially more cost-effective than building new futures games when budgets for research or practitioner projects are considered. The use of existing game development tools, including futures-specific ‘middleware’ such as the *Tygron* engine, also helps facilitate game development. Game jams are often based on voluntary involvement and just require some logistical funding.

However, some of the ideas proposed are for more structural changes in the interactions between futures games and the commercial game sector. For games and game resources aimed at specific futures questions and applications, traditional funding sources such as government grants or foundation support will be relatively easier to find. It can be expected that this includes supportive tools like assets in game design environments or new dedicated game engines. My recommendation would be to find matching resources in futures-oriented fields on the one hand and game contexts on the other. An example has been the collaboration between the TRANSMANGO project on the future of food and the JamToday applied games network (Ballard et al., 2018).

However, a number of ideas presented in the paper focus more on the arguably less concrete idea of societal futures literacy and engaging with games as social imaginaries. While research and innovation funds from both futures and games directions could be found, such ‘common good’ objectives could actually leverage funding from publics. Kickstarter is very commonly used to fund independent games that do not otherwise have a clear business case; but kickstarter projects on futures games are still quite rare, with some exceptions in the board game world (Couture, 2016). Kickstarted games and game resources could, furthermore, benefit from early access mechanisms to help improve their ideas with user groups while development goes on.

Finally, the suggested conversations between game developers and futures practitioners and researchers to open up what futures are focused on in games could relatively easily be organized for specific game development events; but a more systemic and continuous push for this blurring of the lines between futures games and the game sector would likely require the efforts of a focused organization – even a small but well-connected team of people could make a significant impact in this regard. The starting point for such efforts could be organizations like Games for Change who already work on the integration of the game sector and games for social impact, and who are specifically taking a lead in the recognition of the social impact potential of ostensibly ‘commercial’ games.

5. Conclusions

This paper has investigated transformative developments in the game sector, and proposed that these developments bring significant opportunities for the field and practice of futures, and for wider societal engagement with the future. The changes in players, developers, tools, dissemination and media around games offer many opportunities for deeper, more diverse, more up-scaled engagement with futures. Some of the game sector’s developments connect in productive ways to innovative new work in futures games; while others are complementary to these innovations. The recommendations that emerged from this comparison present an ambitious but ultimately feasible agenda that could stimulate the commercial game sector’s engagement with futures gaming, and thereby perhaps significantly opening up the social imaginaries of the world’s rapidly growing population of 2 billion game players.

Acknowledgements

This research has been supported by the TRANSMANGO project. TRANSMANGO is granted by the EU under 7th Framework Programme, theme KBBE.2013.2.5-01 (Assessment of the impact of global drivers of change on Europe’s food security), Grant agreement No. 613532. Furthermore, the research presented in this article has been supported by the EU FP7 CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) with funds provided by the CGIAR Fund Council, Australia (ACIAR), European Union, International Fund for Agricultural Development (IFAD), New Zealand, Netherlands, Switzerland, UK and Thailand. Insights in this paper were also inspired by highly constructive collaborations with the Horizon 2020 program JamToday and the Future Earth-supported projects Bright Spots: Seeds of Good Anthropocenes and the Anthronaut Project. I would like to thank the many students and researchers who participated in the game jams mentioned as examples. Special thanks to Elisabeth van de Grift for reviewing a draft of this paper. I would like to thank the duckfeed.tv podcasting network hosts and community of supporters, and the ExtraCredits and Errant Signal YouTube channels for alerting me to a number of the examples I discuss. Finally, I would like to thank the two anonymous reviewers for their excellent feedback, and the Research Institute for Humanity and Nature in Kyoto, Japan for

allowing me to stay in their midst and for providing inspiration during the revision of this article.

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