



Utrecht University

# **Beyond Fallout -**

## **Analyzing the use of (sustainable) futures in the game sector**

Master Thesis

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Credits to be obtained: 45 ECTS

Master Sustainable Development

Track: Earth System Governance

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26.07.2019

## **Abstract**

In the presence of the Anthropocene, human behavior is considered to be the cause as well as the solution to current and upcoming issues of global environmental problems. Creating pathways towards sustainable development is therefore a crucial next step. Imagining these pathways is a difficult endeavor, however integrating collective imaginings about the future may be fruitful for creating pathways. These imaginings are referred to as futures social imaginaries in this research. With the media being a conveyer of social norms and beliefs, commercial games make a unique type of media, that could potentially already impact these future social imaginaries by the futures these games are displaying. Therefore, this study examines the depiction of futures within commercial games that are expected to be of preliminary dystopic nature as well as having a possible effect on the players. To collect this data, a collaborative framework was developed that examines the futures type, game design and more specific content of the games by a set of explorative and descriptive indicators, allowing to map the games into the different futures they show. As a next step, interviews with various different actors from the commercial game sector were conducted to identify potential drivers and barriers to diversify futures within games by making recommendations for changing the game sector. This research indicates a prevalence of bleak dystopic worlds within commercial games and assumes an impact on the player's futures social imaginaries, though drawing exact results is difficult. Instead, this study stresses the importance of the complexity of player agency that might actively help to develop and or improve futures literacy skills of the players. Therefore, incorporating a more diverse set of futures into the game sector as well as advocating interactive complexity might make commercial games a(n) (entertaining) tool for enhancing public capabilities to imagine pathways to desirable and sustainable futures.

**Key concepts:** Commercial games, futures, social imaginaries, futures literacy, game sector

## **Acknowledgements**

I would like to express my very great appreciation to my supervisor at Utrecht University to Dr. Joost Vervoort for his enthusiasm, constructive criticism and guidance along the project. His continuous encouragements were vital for the development of this thesis.

I'd like to thank my second reader Prof. dr. Maarten Hajer for assessment of my research proposal as well as my thesis. Additionally, I would like to thank the Stockholm Resilience Center for creative input in the development of the collaborative framework of this thesis. I would like to express my gratitude for the time and insights the interviewees have given me into the field. My special thanks are extended to my reviewers Jeffrey Ketting and Sjors van Mourik, for giving me extended feedback on my thesis.

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## 1. Introduction

As identified by Rockström et al., (2009) the 'Anthropocene' pushes the global system to the boundaries of a safe operating space for humanity, with incalculable consequences for humankind, biodiversity and climate. Human behavior is held accountable for the damage, but also for the measures to be taken to steer away from catastrophic outcomes in the future and create pathways to a more sustainable future (Bai et al., 2016).

Such pathways to sustainability are hard to imagine, but they have become a key focus in the scientific community (Byskov, Markard, & Dahl, 2018). However, research on sustainability pathways has been critiqued as not sufficiently involving the broader collective imaginings of potential futures that guide societies.

The concepts of imaginaries defined by Jasanoff and Kim (2015) as 'sociotechnical imaginaries' describe ideas about desirable futures, that are enforced through collective, institutional and public beliefs and ideas that shape the landscape of social life. The influence of imaginaries is described twofold by Hajer and Pelzer (2018): "[...] imaginaries have a double function; they are both an achievable *aim* and a *way* to achieve this aim." (p. 223). With social imaginaries involving conceptions of pasts, presents and futures (Taylor, 2002) this research focused solely on the latter perspective of collective imaginaries. Such will from now on for this research be described as *future social imaginaries*, adapted from the literature (Hajer & Pelzer, 2018; Jasanoff & Kim, 2015; Taylor, 2002).

Through the lens of future social imaginaries, futures can be understood as collectively constructed and performed in the present: "*The future does not exist in the present but anticipation does. The form the future takes in the present is anticipation*" (Miller, 2018, p. 2). These anticipatory imaginaries can therefore either hinder or boost development towards more sustainable futures, as futures need to be anticipated to work towards them and for them to become reality (Ostrom et al., 2002). One aspect that is responsible for shaping these future imaginaries is the extent to which an individual is *futures literate* (Miller, 2007).

Future literacy describes the ability to plan and create ideas of futures by understanding the abilities of the present and using it to plan ahead (Miller, 2007), as "[a] futures literate person has acquired the skills needed to decide why and how to use their imagination to

introduce the non-existent future into the present.” (Miller, 2018 p. 15). By this, an individual is exhausting the possibilities to develop (desirable) imaginaries of futures as well as integrating the prospect of a certain future into decision-making processes (Miller, 2007). Futures literacy is rooted and determined by the underlying, often subconscious assumptions an individual or a society may hold towards certain types of futures, hindering some to be developed, while others thrive on the present anticipatory assumptions (Miller, 2018). These assumptions are the significant components of futures literacy and are thought to be created through different social mechanisms such as history, economy, psychology and sociology. Exactly determining where underlying assumptions are stemming from remains difficult (Miller, 2018). The role of media in this process has not been closely assessed so far, though research recognizes the function of media as a conveyer of cultural and social norms to the public as a determining factor for shaping social imaginaries (Jasanoff & Kim, 2015). Hence, the role of media is significant when looking at the creation of future social imaginaries and future literacy.

Examining prominent media allows to gain insights into the existing futures social imaginaries and possible future worlds, that lie within these imaginaries. One so far relatively under researched part of media are (commercial) video games. Commercial games stand out by both their popularity and economic value, as well as their unique level of interactivity between game and player compared to other forms of media.

The output of the game sector doubled that of the movie industry in 2016, with returns worth more than 99 billion US dollars and two billion players globally, the game sector forms a significant part of the media with trends indicating further growth (Vervoort, 2018). The most active age group are 18 – 29 year old's and make as much as 60% of the population in the U.S, with females making up 39% of this age group (Brown, 2017). Concomitantly the rising gamer population, the game development sector is also growing increasingly and reached over 200.000 employees in the US in 2017 (Vervoort, 2018).

Games form a special type of media, as some characteristics enable distinct experiences for consumers of this type of media. As soon as a player starts playing, a special interaction between the game and the player is established (Kirkpatrick, 2013). Farca (2018) argues, that even though all forms of media effect their consumers, the interaction between the game and the player unravels in two exceptional ways: First, the player is required to act ergodically, by interpreting and investing into actions within their understanding of the game world. Second, the player will subconsciously draw on everyday world knowledge

for making in-game decisions of all types which will then provide insights in the underlying beliefs and value systems a player might hold. These interactions require the player to build unique interpretations, experiences and relationships to the created world (Kirkpatrick, 2013). Both the popularity and uniqueness of this type of media point towards the importance of further examining games and the potential future social imaginaries might carry.

This research aims to assess the depiction of futures within commercial games. Vervoort (2018) observed, that the current game sector does not represent a wide range of possibilities, often engaging players with rather dystopian futures, lacking utopian imaginaries. This indicates a need to identify which types of future imaginaries are available and can be available to publics globally to understand the future social imaginaries they are exposed to and realize how games contribute or limit narratives about futures.

The main focus of this research is therefore how games represent and could represent future worlds and how the game sector could be changed to stimulate diversification of futures within games. To investigate the expectation that futures in games are primarily dystopic, the commercial game sector will be mapped onto a future scenario possibility space to identify which future types are over- or underrepresented in this form of media. This research builds on the assumption that commercial games have an impact on future social imaginaries, based on the literature. Building on the mapping of commercial games of potential futures, this research additionally aims to explore what factors are necessary to diversify futures within games by identifying drivers, barriers and opportunities.

The main research question is therefore as follows:

*How do games represent different futures in the context of sustainability and what are the possibilities to diversify futures within the game sector?*

The following sub-questions inform this research:

1. How can commercial games be mapped onto different potential futures?
2. Why are some types of futures overrepresented and underrepresented?
3. What recommendations can be given to the game sector to include more diverse types of futures in games?

To accomplish this, the current research will look more in-depth into the theory of future social imaginaries, the potential role of media and, more specifically, the role of commercial games. Subsequently the methods of this research will be laid out, resulting in an analytical framework to map the futures depicted in commercial games. To identify factors necessary to diversify futures in games, multiple actors from different perspectives of the game sector will be interviewed. Finally, the data collections will be combined, allowing for a final answer and conclude in further research possibilities and recommendations. The knowledge gained from this study lies in the interest of sustainable development, as engaging societies with future imaginaries and equipping them with the ability to engage with these worlds is a crucial stepping stone on the way to sustainable transformations. Investigating techniques to engage more people with the ability to imagine futures is also in the purpose of Earth System Governance, with enhancing anticipatory governance at its core.



## 2. Theory

In the following chapter, the future social imaginaries, the role of media and more specifically games within futures social imaginaries will be assessed, as well as giving a definition for commercial games.

### 2.1 Future social imaginaries

To understand the role social imaginaries play in shaping cultural processes, first an appropriate definition must be found. This study bases its definition of futures social imaginaries on the scholars Jasanoff and Kim (2015), Hajer and Pelzer (2018) and Taylor (2002).

Charles Taylor (2002) defines social imaginaries as describing a certain set of values that is held by any form of societal group that shapes institutions, laws, symbols and beliefs. Social imaginaries are structured by an understanding of the world surrounding us, which in turn shapes the reality again. Taylor (2002) describes the term as everything that happens on an interpersonal level, expectations of individuals in their daily life that coincide with them being met, and normative images and values that underlie human actions. Every action is therefore rooted in the deeper understanding of society and serves the 'bigger' purpose of values. He defines three crucial areas or settings in which modern western social imaginaries takes place: the economy, the public field and self-governance. Moreover, he stresses that modernity has a pluralistic nature, as it unfolds in different ways, depending on the social imaginaries of a society.

To better understand how these social imaginaries of futures might influence actions, Hajer and Pelzer (2018) discuss key factors for shaping future outcomes. They argue that expectations about the future function as roadmaps which coordinate current behavior and actions, thereby altering the present. These expectations may boost technical advancements or even system transformations. Therefore, future social imaginaries should be considered in the political setting they occur in, either hindering or boosting developments through possible expectations.

Jasanoff and Kim's (2015) definition, framed as socio-technical imaginaries, are achieved through the strong connection to technology, as it shapes social life and its positive and desirable advancements. This perspective understands science and technology as pivotal influencers on modern social imaginaries with the power to transform societal structures. Advances may hold the possibilities for collective positive future imaginations, as they are

driven by improving facets of life, hence ultimately inhere positive imaginations and change.

The definition of Taylor (2002) includes a broad spectrum of social imaginaries. As this research focused solely on the futures aspect of social imaginaries, the term future social imaginaries was chosen. By moving beyond the predominantly normative interpretation of futures in socio-technical imaginaries (Jasanoff & Kim, 2015), while also incorporating insights about the possible transformative power of future imaginaries (Hajer and Pelzer, 2018), this research draws on an inclusive understanding of the concept of *future social imaginaries*.

## 2.2 Futures Literacy

Futures literacy is the act of training people to engage more actively with futures and is understood as a (mental) skill, similar to learning a language, improving overtime (Miller, 2007). With improved futures literacy, citizens are increasingly capable of creatively imagining different future worlds and the richness of futures social imaginaries could be enhanced (Miller, 2015). Being a skill, Miller (2007) proposes three skill levels that can be reached: 1) *awareness*, sparked through dialogues and discussion with one another, 2) *discovery* as “[...] the capacity to overcome the limitations imposed by values and expectations when thinking about the future.” (p. 350) and is characterized by critically engaging with new ideas about a future. And lastly 3) *choice*, as the ability to construct future scenarios by extrapolating values and beliefs to draw inferences about present day ideas about the future.

## 2.3 Media and futures social imaginaries

Collective imaginaries as pathways for reaching potential futures are shaped by and reflected in media narratives and imagery in all forms (Kirkpatrick, 2013). Tisdell (2007) emphasized the relevance of media in shaping social imaginaries by using three arguments. Firstly, the media acts as an overarching net between a society, (passively) connecting all members of a social group and creating symbolic meaning that then becomes familiar to the collective. Secondly, as a consequence the scope of a group widens, as media delivers the same narrative independent to geographical space. Lastly, being exposed to media will lead to a realization within a society that makes it possible to break with cultural norms and beliefs, as new narratives can be discovered. This comes with a degree of dependency as every person then relies on the media for the transmission of a certain narrative.

Hassler-Forest (2017) expresses the power and public significance a product of entertainment can have on a society, using the example of the *Star Wars* movie series, by shaping a political landscape around the *Star Wars* narrative. The concept of transmediality exemplifies this potential power. Transmediality can both describe the synergy between consumers and entertainment media, shaping the media from a consumer side, or referring to it as a business practice of extending one narrative of a film or game to other types of media, with both forms being broadly present in this example (Hassler-Forest, 2017). Moreover, globalization, technical advancements and participation among consumers are changing the understanding and the boundaries of current media (Hassler-Forest & Nicklas, 2015). With media being increasingly converging across platforms, adapting narratives and being shaped in new ways, Hassler-Forest and Nicklas (2015) argue, that important for analyzing (converging) media are “[...] the socio-cultural mechanisms and political economies that determine their value.” (p. 3) This includes “[...] the cultural, economic, and social practices that surround their production, distribution, and consumption” (p. 3) to further identify underlying assumptions of specific media (Hassler-Forest & Nicklas, 2015).

How the media conveys captivating narratives that can potentially shape the beliefs of individuals can be seen on the example of the values and ideas delivered through the books of J.K. Rowling’s *Harry Potter* series. In this study, Anthony Gierzynski (2013) examined a potential relationship between values present in the books and the likeliness of readers to be influenced by the *Harry Potter factor*, a term introduced by Gierzynski (2013) to conceptualize the imprinting of political socialization through the books and or the movies. He concluded, that “[f]iction – whether found in books, films, television, shows, or video games – has the power to shape our politics” (p. 79) by having a suspected effect on the consumers through the narratives. To understand the political ideas and values a person holds, it is therefore crucial to investigate the content of consumed entertainment (Gierzynski, 2013).

#### 2.4 Games and future social imaginaries

Games are a distinctive part of media, that may add significantly to help understand mechanisms and structures in society as they are already a tool to influence future social imaginaries (Kirkpatrick, 2013). Moreover, they can distribute future imaginaries to a larger audience and recent developments in the commercial game sector increasingly expand the possible narratives existing in games, making it an attractive medium for delivering

future imaginaries (Vervoort, 2018). This was also examined by Mary Flanagan, who realizes that the capabilities of using games can be manifold:

*What if some games, and the more general concept of 'play' not only provide outlets for entertainment but also function as means for creative expression, as instruments for conceptual thinking, or as tools to help examine or work through social issues?*

(Flanagan, 2009 p. 1)

Games can hold both narratological components as well as elements of ludology, though a game might consist out of “gaming, narratives, or fiction, [...] we cannot expect of any given game that it will contain any one of these things” (Tavinor, 2008 p.11). With video games distinguishing themselves by both being digital and visual, closely defining this type of games remains difficult (Tavinor, 2008). Espen Aarseth (1997) argues, that each narratological stream in a game has to be taken up by the player which brings the necessity to engage with the game world in a “nontrivial effort” (Aarseth, 1997 p.1) which can create different narratives depending on the video game player (Aarseth, 1997). However, Tavinor (2008) points out that this applies to all representative arts and the interactive factor Aarseth (1997) relies on may not be fulfilled by all games. Tavinor (2008 p.12) hence proposes the following definition for videogames:

*X is a videogame iff it is an artefact in a digital visual medium, is intended primarily as an object of entertainment, and is intended to provide such entertainment through the employment of one or both of the following modes of engagement: rule-bound gameplay or interactive fiction.*

Rule-bound gameplay refers to a set of rules and clearly defined goals for a game, in which the player knows what to expect. Interactive fiction includes all games that might lack the basic rule-bound principle but feature an interactivity that allows the player to part take or even shape the direction of the game (Tavinor, 2008).

Farca (2018) stresses, that next to the ergodic aspects of games that are common in fiction among different platforms, games stand out by their interactive aspect, that allow players to draw on everyday world experiences and knowledge to make decisions in a game. However, game worlds that present to be vastly different from the everyday world, such as dystopic settings, may provide even more insights (Farca, 2018). With parts of the

everyday world distorted and altered, showing societies partially similar to today but modified at the same time, the player is presented with a “refracted mirror of what [the player] knows” (Farca, 2018 p. 13), forcing the player to connect dots between unknown worlds and the everyday world, ultimately giving away underlying values and beliefs of a player (Farca, 2018). This can eventually feed back into the player’s behavior in everyday world context, as the player “may explore solutions (or attenuations) for similar crises in the [everyday] world” (Farca, 2018 p. 14) by transferring game learned behavior into everyday world situations (Farca, 2018). With games holding the possibility to engage players with future scenarios while also enabling a shift of perspective through the game design itself, authenticity and a deeper level of involvement with the player are generated (Vervoort, 2018).

## 2.5 Commercial Games

This study limits itself to games that can be considered ‘commercial’. Commercial games include casual games, core games and hardcore games, and exclude categories such as serious- or educational games. With casual games referring to games that are usually shorter in length with less complicated game mechanics as well as brief and flexible playing sessions, hardcore games on the other hand are characterized by their competitiveness and as opposed to casual game steep learning curve, which demands engagement of the players (Kuittinen, Kultima, Niemelä, & Paavilainen, 2008). Core games are considered games that fall in between those two categories (Kuittinen et al., 2008). Serious or educational games are excluded from this definition, as their purpose forfeits the pure entertaining purpose. Serious games are used for educating players about certain situations, that can be experienced in the serious game context that would otherwise be too dangerous, costly or otherwise impossible in the everyday world (Susi, Johannesson, & Backlund, 2007). Additionally, the focus lies on game types that are connected with a commercial interest, as commercial games are a consumable type of media and part of the cultural industry (Kerr, 2006).

## 4. Research design and strategy

The research methods for this project will be elucidated, resulting in establishing an analytical framework.

### 4.1 Research strategy

The chosen research method for this project is divided into three consecutive steps that will allow an in-depth examination of existing and non-existing future typologies in the commercial game sector, as well as opportunities to diversify the game sector. The steps are 1) a literature review for future scenario spaces, which results in a collaborative framework; 2) an application of the framework onto the commercial game sector; 3) interviews with actors from the field of games, game development and foresight studies (see figure 1).

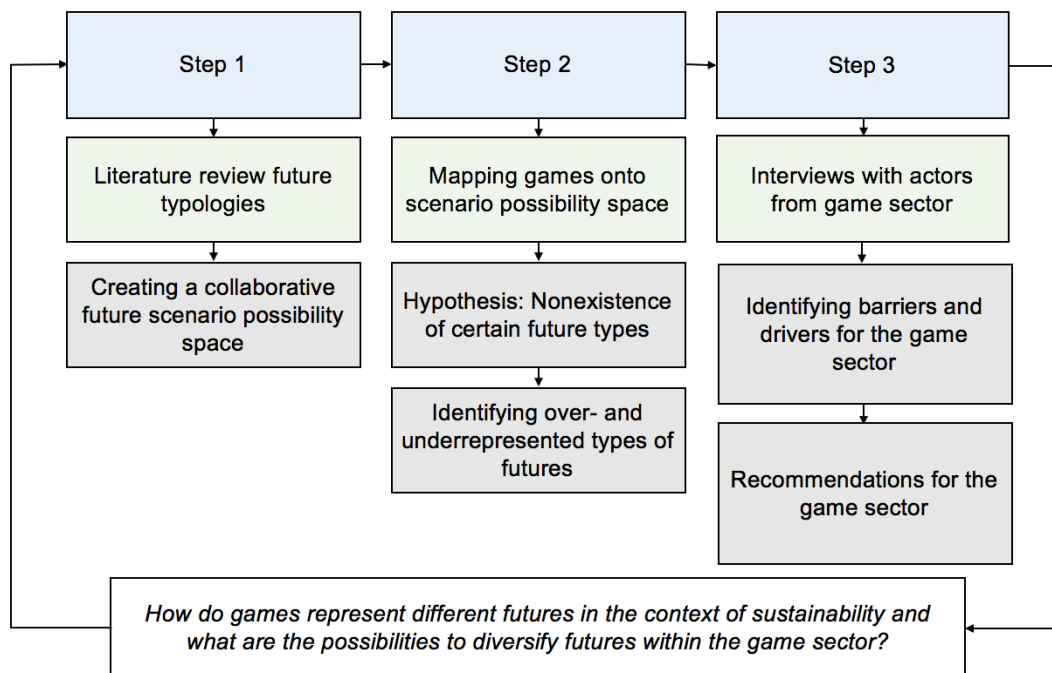


Figure 1: Research framework

The basis for this research consists out of an extensive literature review of future typologies which will contribute to a collaborative framework that will be used as the foundation of the following steps of the research. Definitions of future typologies will be gathered from different scholars, additionally examining the perspective of futures to receive a greater understanding of the authors' views. This developed framework will then be applied to screen the commercial game sector via the platforms *Steam* and *IMDb*, to sort games into different categories, resulting in an overview of the distribution of future types present in games. The underlying assumption of a gap between future types

identified and futures displayed in games will then be reviewed on the basis of the findings. The final step will consist of field research in form of semi-structured interviews with various actors of the field: game developers, game designers, researchers from future studies, game researchers, future studies researchers as well as educated/ experienced game players. This variety allows for an in-depth analysis of underlying causes for the absence of certain future typologies, while also engaging with possible drivers and barriers identified by the interviewees.

#### 4.2 Research material

The research material for the three steps of the research includes a literature review for the creation of the framework, a content analysis of commercial games and semi-structured interviews. In order to answer the main research question, the three sub questions will be answered using different approaches (see table 1). The first sub question relies on the development of a future scenario possibility space that will result in a framework in order to be able to map the commercial games onto them. To get the broadest possible idea of potential future types, future scenarios from science fiction, games and other types of media will be included into this framework. The second question draws on the assumption that some types of futures are underrepresented in the commercial game sector (Vervoort, 2018). In order to investigate this, the results of question 1 will be analyzed and then interviews will be used to obtain insights. Question 3 is going to be answered by drawing on the results of the interview findings.

*Table 1: Research question and methods used*

1. How can commercial games be mapped onto different potential futures?	Literature review and collaboration to develop scenario possibility space, content analysis of games
2. Why are some types of futures overrepresented or underrepresented?	Results of question 1 and interviews
3. What recommendations can be given to the game sector to include more diverse types of futures in games?	Semi-structured interviews

### 4.3 Data collection and processing

The literature review is based on a keyword search using the search engines of *Google Scholar* and *Scopus*, searching the terms of “future typologies”, “future scenarios” and “future studies”. This will result in findings relevant to contribute to the collaborative framework on future scenario possibility spaces.

Using a qualitative approach, the next step of the research uses the framework (further specified in 4.4) as a funnel to categorize commercial games listed in the online library of Steam as well rankings from IMDb. Steam is an online platform founded in 2003 by *Valve*, which main functions are distributing digital content in form of computer games, allowing direct feedback between game developers and players (Valve Corporation, 2018). Since its emergence it is steadily gaining users, increasing from 6 million peak-time users in 2006 to 18.5 million in 2018 (Gough, 2019a). To select the games for the analysis, a list of the most favorite 250 science-fiction games rated on Steam was the basis for the selection (Steam, 2019). Additionally, a list of user ratings concerning science-fiction games across platforms were also considered, using the website of IMDb. IMDb is a database that allows users to rate on different types of media, including commercial games (IMDb, 2019). From these two lists, the first, and therefore most rated games were picked and analyzed for the future they are displaying. With the list of Steam featuring computer games, games from other platforms were complemented by using the IMDb database. Taking the top 70 games of both lists resulted in multiple overlaps, adding more games from each ranking until the data collection reached a total of 70 games.

Information was mostly retrieved through the website of the game itself as well as in a few cases from *Wikipedia*, when the developing studio’s website had been closed (see Annex I). After gathering the information about the games and integrating it into the framework, one part of the information was processed by conducting content analyses on the material, using open and axial coding to identify key data points and categories (Strauss & Corbin, 1990). The other part of information was sorted into predefined categories.

For the last step, semi-structured interviews were used to identify possible drivers and barriers for changing the game sector. Semi-structured interviews give the possibility to react and adapt to the knowledge base of the interview partner, enhancing the information gained by being able to adjust to the questions asked and order of topics covered (Flick, 2014). At this point, the snowballing principle was used, which describes the connection to new interview partners by people already encountered in interviews (Verschuren &



Doorewaard, 2010), to get in touch with additional relevant interview partners. The topics included in the interview guide can be found in the annex III.

The aim was to speak with a number of different actors from the field. When trying to evaluate the barriers and drivers of change for diversifying futures displayed by games, the issue should be considered from as many angles as possible. Therefore, three main groups of interviewees needed to be involved: those working with games, those engaging with games and those attending or researching about games. The final distributions of interviewees can be seen in table 2.

*Table 2: Distribution of interviewees that participated, categorized by their field, number of interviewees as well as their acronyms used in the following sections*

<b>Field</b>	<b>Number of interviewees</b>	<b>Acronyms</b>
<i>Working with games</i>		
Teacher for game studies	1	T1
Designers for indie game company	1	DESI1
Developers for indie game company	3	DEVI1, DEVI2, DEVI3
Developer for mainstream game company	1	DA1
Mainstream game publishers	1	P1
<i>Engaging with games</i>		
Table top role-player	1	TT1
Youtuber (Let's plays) / Gamers	2	Y1, Y2
Gamer online community	2	G1, G2
<i>Researching about games</i>		
Researchers related to (serious) games	3	RS1, RS2, RS3
Researchers related to anticipatory governance	1	RAG1
Scenarios experts	1	SE1
Researchers related to social imaginaries, desirable futures	3	SI1, SI2, SI3

The acronyms were introduced to anonymize the interview partners while giving insights about their role within the game sector for improved readability throughout this study. The

letters indicate the field of the actor, as for example DEVI1 is a game developer (DEV) working in the indie game sector (I) while being the first one interviewed (1).

Under the category of 'working with games' fall actors from the game sector that are involved in production processes of commercial games, such as game developers, game designers and game publishers. Multiple studios were contacted, both mainstream companies as well as indie game companies to arrange interviews. Due to time constraints, two interviewees decided to participate via questionnaires instead (game publishing studio P1 and indie game developer DEVI3). The questionnaire was derived from the semi-structured interview guide and included a short description of the project, send via email (see appendix V).

Participants of the category 'engaging with games' ranged from experienced commercial gamers, towards game journalists, games studies teachers as well as engaged gamers from other fields than the commercial game sector. To reach a multitude of gamers, two gaming communities were involved in this project, the *Duckfeed* community and the *Waypoint* community, which is a derivative of the online magazine *Vice* (G1 and G2). The research conducted within these communities were in form of *online focus groups* where a group of people had the opportunity to discuss about questions and topics regarding the project. With *focus groups* having the advantage of participants openly discussing about questions, online focus groups allow for reaching a wider range of participants interested in the same topic (Fielding, Lee, & Blank, 2008) in this case gaming. Additionally, two experienced gamers were interviewed that hold accounts with the video platform *YouTube* with each around 5000 followers playing games and discussing about them (interviewees Y1 and Y2). A table top role playing gamer was interviewed as well to gain insights from an experienced gamer from a different field than the commercial game sector (TT1). Lastly, a game studies teacher working with bachelor students on subjects like game design and development was interviewed as well (T1).

The last category of interviewees focused on researchers working on different related topics. Interviewees in this category originate from different research areas, namely scenarios experts (SE1), the use and application of serious games (RS1, RS2 and RS3), anticipatory governance (RAG1) and research related to further exploring social imaginaries (SI1, SI2 and SI3).

The last step of data processing was the incorporation of the results from both the content analysis as well as the interviews into a coding program, that allows to understand in-depth connections within and between both data bodies. The software used was *NVivo 12*. This was deemed especially helpful for clustering similarities and coherences of the data of the explorative parts of the data. By using the coding technique of Strauss and Corbin (1990), parts of the data were at first openly coded and sifted for overarching categories. After this first step, the categories were then stressed and compared with each other by axial coding.

The combination of these steps will lead towards answering the research questions.

#### 4.4 Analytical framework

To investigate which future social imaginaries might be imposed on the players, the potential futures the games represent need to be assessed. A framework was established that aims to map commercial games onto a possible future scenario space, allowing an analysis of existing types of games as well as recognizing attributes of different social imaginaries communicated through those future types. The framework was developed in collaboration with other researchers, to create a robust framework that may extend its use into other studies as well. Participating in this collaboration were Garry Peterson (Stockholm Resilience Center), Christoph Rupprecht (Research Institute for Humanity and Nature, Kyoto), Andrew Merrie (Stockholm Resilience Center) and Joost Vervoort (Utrecht University). This framework mostly draws on literature by Hunt et al. (2012), Candy (2017) and Farca (2018) in the aim to identify and categorize future types within the games.

The framework allows both for organizing the games' content into existing structures, as well as openly analyzing the content, to gain the most insights into the game sector while also being able to compare the games with one another. The aim is to examine a game closely for its depiction of a future, the game design and to examine certain content elements more closely, for example the environment or political structures. The types of futures, the game design and content details will allow to holistically assess a game for its future imagery. The incorporation of future types and game design elements into a two-axis matrix as a last step will allow to visualize the overall orientation of a game and stress difference and similarities in distribution. The official websites of the games were examined in order to obtain the necessary information. In the following, each categories' indicators will be assessed and explained, concluding in table 3.

Table 3: List of indicators to assess futures in games. The evaluation by a content analysis refers to a not predefined set of indicators

Indicator	Evaluation
<b>Future types</b>	
Futures types by Hunt et al. (2012)	Typologies ranging from market forces to breakdown
Typologies of dystopias in games (Farca, 2018)	Typologies ranging from utopic to dystopic settings
Futures themes	Content analysis
Threat type	Content analysis
<b>Game design</b>	
Game type	Indie game, mainstream game
Genre	Action, role-playing games, simulation, strategy
Game mechanics	Combat, stealth, exploring, puzzling, etc.
Perspective	3D, 2D, 2 ½ D
Scale	Local, national, global, cosmic
Protagonist type	Content analysis
Protagonist value	Content analysis
Antagonist	Content analysis
Agency over outcome by protagonist	High, medium, low
Agency over outcome by player	High, medium, low
<b>Content</b>	
State of ecosystems	Content analysis
Agency of nature	Content analysis
System of planets	Yes or no
Human life	Content analysis
Geopolitical relations	Content analysis
Forms of governments	Anarchy, autocracy, democracy, oligarchy, unspecified
State of economy	Market economy, market socialism, planned socialist economy, subsistence economy

Technology	Content analysis
<b>Integration of future type and game design</b>	
Essence and influence (Candy, 2017)	Essence and influence matrix with future types by Hunt et al. (2012) and differentiation between mainstream and indie games

#### 4.4.1 Futures in games

As the number of different futures in the games is vast, drawing on overarching scenario typologies allows to review and compare between different types of futures imposed through the games to attempt decoding the social imaginaries communicated (Van Notten, 2005). To define a scenario possibilities space, different literature has been examined by their conception of future typologies. However, different future typologies present in the literature does not indicate their practicability (van Vuuren, Kok, Girod, Lucas, & de Vries, 2012) Additionally, future typologies are often formulated in a way of positive outcome, giving 'worst case scenarios' little room in the literature. Negative scenarios are usually the flipside of the typologies defined by the scholars, but rarely make independent categories themselves (van Vuuren et al., 2012).

Future typologies were found in the work of van Vuuren et al. (2012). They identify six different scenarios 'families': 1) *economic optimism*, 2) *reformed markets*, 3) *global sustainable development*, 4) *regional markets*, 5) *regional sustainable development* and 6) *business-as-usual*. In contrast to the future types by Hunt et al. (2012), these lack negative futures scenario outcomes. Another set of future typologies was introduced by Dator (2009), who identified four archetypes ranging from 1) *continued growth*, 2) *collapse* as futures that are characterized through major shifts in economic or environmental systems, 3) *discipline*, in which social equity and resource allocation is the main objective, and lastly 4) a *transformational society* that is based on major technological advancements that would alter life on earth extremely. However, the typologies of Dator (2009) were not practical for the application in the framework, as they missed more positive future outcomes. Partly overlapping were the futures types identified by Hunt et al. (2012). The typologies show negative and positive outcomes, reaching from futures that are driven by the market, to sustainable futures as well as catastrophic scenarios.

From revising and searching different literature for future typologies, the six future types identified by Hunt et al. (2012) appear the most applicable for this research, as they hold

typologies that are optimistic as well as pessimistic. These six types are *market forces*, *policy reform*, *new sustainability paradigm*, *eco-communalism*, *fortress world* and *breakdown* (Hunt et al., 2012).

- *Market forces* describe a future typology that results from extrapolating today's market orientated behavior into the future, assuming neither technological advances or (environmental) policy shifts, nor environmental or humanitarian catastrophes. It favors free trade, open markets and by this propelled globalization with the underlying belief of the markets intrinsically reacting to arising issues themselves.
- *Policy reforms* speaks for a policy transformation powerful enough to shift away from business-as-usual methods, setting sustainability as the crucial turning point. These policy reforms will incise into global economy structures, in order to redirect towards environmental and social well-being. However, these reforms occur in an otherwise unaltered settings such as the same top-down governance structures, unchanged institutions and no behavior shifts regarding consumerism.
- *The new sustainability paradigm* is characterized in the face of an upcoming crisis which results in reorientation of human values towards living within the constraints of the planet while achieving just and fair living condition among humans and the environment. Focusing on education, healthcare, community and wellbeing, this typology remains in the arena of a globalized planet and does not retreat to localism.
- In contrast to the New Sustainability Paradigm, *eco-communalism* favors fragmented local patches of functioning communities. Determined by low economic growth, local democracies and highly sustainable conditions, these communities are decentralized and self-sufficient.
- *A fortress world* describes a future typology that is characterized by authoritarian controls in which the majority of the population lives in poverty. The wealthy part of the civilization is shielded from the poor, living in prosperity and health, where resources are scarce and keep being exploited by the wealthy, causing struggle and crisis for the poor.
- A future characterized by the typology of *breakdown* is drawn by crisis and chaos with the conditions exceedingly getting worse beyond the ability to regain control. Over time, institutions, governments and authorities lose power, with economies crashing and unemployment rising. Ultimately population numbers go back, as the consequence of depressing living conditions with little hope for improvement.

Additionally, a second set of typologies will be used to categorize the games. Farca (2018) defined a set of typologies to identify dystopias within games that were included in the framework, to enrich the overall classification of future types in games with their utopic or dystopic orientation. Farca's (2018) typologies acknowledge a difference between dystopic and utopic world in terms of comparing the image of the future to the everyday world in terms of a (slightly) better or (slightly) worse image. Farca's (2018) typologies differ from the typologies by Hunt et al. (2012) by determining the level of interactivity, hence if a game focusses on the plot, by means of a linear storyline or on interactivity. The presence and role of hope together with the abilities of the players are the crucial distinction points, as "[...] the prospect of hope depends on two interacting features: *the game's dynamic* and *the player*" (Farca, 2018 p.92).

This results in a set of different typologies: the *classic dystopia*, the *critical dystopia type 1*, *critical dystopia type 2*, *critical utopia type 1*, *critical utopia type 2* and the *anti-utopia* (Farca, 2018). A classic dystopia describes a game world, that is designed in which the general tendency is grim and worse than the actual world and the player's abilities do not reach beyond the limits of the dystopic setting. In the critical dystopia type 1 the possibility for change towards positive outcomes is written into the game's narrative, however the game unfolds in a linear way, leaving little or no room for the player to change the outcome of the game. Type 2, however, is characterized by interactivity, that allows the player to determine the outcome of the game by their decisions, leaving room to explore positive, negative or neutral options (Farca, 2018). Alternatively, the critical utopia describes games that are set in a better world from today, though a future society is facing issues that the game aims to address. Type 1 encompasses games that focus on the plot and the linearity of the game. Different endings may exist, but the outcome is somewhat set by the game. Type 2 describes games, that focus on letting the player solve the utopic problems with interactivity that is usually characterized by strategy games in which new colonies are established. Lastly, anti-utopia describes games in which there is no hope for change possible within the game parameters, though the player is not confronted with the game world around him, but rather occupied with forms of combat or other tasks that steer away from the conditions within the fictional worlds. This category is in itself special, as the game world lethargically accepts the bleak world it presents.

The typologies were complemented with two open categories, namely *future theme* and *threat type* that aimed to descriptively assess the futures portrayed in the games. The

future theme category evaluates the different leitmotifs of futures that the games are displaying. Imminent dangers and bigger scale threats the protagonist may face during the games were appraised in the category threat type.

#### 4.5 Game design

Analyzing the game design in its particularities allows to closely examine the special features the medium of commercial games might offer. For this, the game type and genre will be analyzed, followed by the complexity of possibilities a player has to interact in the game.

When defining whether a game classifies as a mainstream game or an indie game, Garda and Grabarczyk (2016) argue, that three factors need to be evaluated for determining if a game qualifies as an indie game. As the boundaries of independent game productions have become increasingly blurry, they introduce three factors to determine if a game is indie or mainstream, namely the financial-, the creative and the publishing independence (Garda & Grabarczyk, 2016).

The financial independence refers to the relationship between developer(s) and their ability to freely allocate resources or possible restrictions by investors. Investors in this case, refers to any third party that invests in the game production, in a way that creates a certain dependence and therefore limits free flow of development, regardless if the investor is private or public (Garda and Grabarczyk, 2016). The creative factor evaluates the relationship between the creators and the audience, inspecting if the developers comply with the consumer demand or follow their own idea of a game. The more the market demand for specific content is addressed, the less creative freedom is possible, for example mainstream game companies are increasingly engaging in game series with the same themes (Garda and Grabarczyk, 2016). Publishing independent is fulfilled “whenever the publisher is also the developer” (Garda and Grabarczyk, 2016) and no third-party publisher is involved, with this referring to the moment of first publication of a game (Garda and Grabarczyk, 2016). The development of game platforms such as Steam boosted this independence, as the need for publishers decreased while at the same time the option of *early access* (pre-final releases of games) reduces resources intense testing phases for (small) studios (Garda and Grabarczyk, 2016).

Garda and Grabarczyk (2016) claim, that to be labeled as an indie game, a minimum of one of these factors has to be fulfilled. Next to these hard factors, a multitude of soft factors



can help determine whether a game classifies as indie or mainstream. Some factors regard whether the game is digitally distributed, how experimental the game design might be, a relatively small team size or the degree of retro style design of the game (Garda and Grabarczyk, 2016; Lipkin, 2013). For defining a mainstream game, the parameters are much blurrier with no exact definition, therefore a mainstream game can be defined as the opposite of an indie game, with game content dependent on financial aspects and restricted creative freedom (Lipkin, 2013). As the determination of all of these factors would have been vastly time consuming, the classification of each game on Steam was used as guideline for defining whether a game is indie or mainstream production.

As a next step, the games were sorted into the main existing video game genres of simulation, strategy, action and role-playing games (Apperley, 2006). Each genre holds different content and parameters, that creates the difference between the genres. In the genre of simulation, the game might include content such as “sports, flying and driving and games that simulate the dynamics of towns, cities, and small communities” (Apperley, 2006) for the player to experience a game world that captures reenactments of familiar activities (Apperley, 2006). In strategy games, the focus is put on learning the rules and coherences in the respective game, with increasingly complex variables, educating the player along the unfolding of the game (Apperley, 2006). The action genre consists of games that can either be in the first- or third person perspective. The content of the games “often require the player to engage in extreme nontrivial actions” (Apperley, 2006) while having to prevent imminent catastrophes (Apperley, 2006). Role-playing games (or adventure games) are characterized by the player building and improving the protagonist, allow the player to strongly relate to their protagonist (Apperley, 2006).

The gameplay and the game mechanics set the stage for the interaction between players and the game itself. With the gameplay describing the range of possible actions in a game in the form of what the players and the game world are able to do, the gameplay can be defined as the actions a player could perform within the game (Fabricatore, 2007). The game mechanics however function as the tool kit to deliver the gameplay (Sicart, 2008), which in best case form a symbiosis with the gameplay to enhance the engaging factor of a game (Fabricatore, 2007). For this analysis, the variations in use of game mechanics as tools to deliver images of the future in the game is of interest, therefore the different game mechanics are evaluated and categorized resulting out of a content analysis of the game, which grants insight into how the future is represented by game mechanics.

Data about the perspective of the game of either 3D, 2D or 2 ½ D, with the latter describing a perspective that lies between 3D and 2D was collected to evaluate the setting a game is displaying. This was complemented by evaluating the scale in which a game is taking place as either local, national, global or cosmic.

Next, the protagonists and antagonists were assessed, the reader forms a close relationship with the characters and starts adapting values repeated in the narrative: “When we become immersed in a story, we are moved to emulate the characteristics of the heroes and reject those of the villains. When we become immersed, we truly experience all that the fictional world offers and take to heart the lessons that our heroes learn.” (Gierzynski, 2013 p. 78) Therefore, both the role and the values of the protagonists were evaluated, as well as the type of antagonist a game was showing. These categories were openly analyzed by using content analyses.

Finally, the agency of outcome aimed to measure the straightforwardness of the narrative a game can offer by measuring how much influence a) the game character and b) the player has over the unravelling of the story. While a) is measuring the significance of the protagonist for the story, b) measures the interactivity and influence the player might have. This was assessed by obtaining a score of either high, medium or low as a result of a content analysis. Farca (2018) stresses the importance of this element in games, as a high level of interactivity has a higher chance to actively engage a player with the game. Additionally, the general presence of interactive features in form of decision-making was evaluated by either present or not present.

#### 4.6 Content

The next step is to examine details of the futures in games more closely in a sustainability context. To realize this, the three pillars of sustainable development - *environment*, *society* and *economy* originally introduced in the UN Agenda 21 (UN, 1992) were translated into the following indicators.

First, the status of the environment was assessed, as well as the degree of nature’s agency to impact the world in a game by openly analyzing them, forming categories out of the content. Additionally, the games were examined by their system of planets, to understand the broader picture of the environment a game was showing.

Evaluating the way human life was constructed and the political setting in which the game world appears reflects the pillar of society of sustainable development. Since the portrayal of humans and human life in the games were manifold and of different natures, this category was assessed in an explorative way. The political setting was split up in geopolitical relations and the societal structure represented in the game. The existing geopolitical relations within the games were treated as an explorative category, as huge differences among the games could be identified and therefore individual categories were created out of the content analysis of the games. The forms of government by power structure differentiate between democracy, oligarchy, autocracy and the absence of government – anarchy (Crick, 1973). Determining the exact power structure was in some cases impractical, as often political structures were only peripherally introduced into the games, orienting on these main categories proved to be more feasible.

The economic pillar was examined by analyzing the state of the economy within games. The future world in a game was assessed by its orientation towards free markets, state regulated markets, planned economies with public ownership or a (non-monetary) subsistence economy as well as how successfully it was functioning, derived from Gregory and Stuart (2013).

Additionally, the role of technology was assessed, as future advancements in science are often at the root of utopian imaginings in science-fiction literature (Claeys, 2010). It is the idea of acknowledging the abilities that lie within “the role of technology as a tool for social transformation” (Claeys, 2010 p. 139) that make it important for science-fiction as well as games. Openly assessing the role of technology within games may therefore allow to holistically comprehend the type of future a game is displaying.

#### 4.7 Integration of future types and game design

Lastly, an indicator was introduced with the intention to summarize the main concepts of the games and map them onto a simplified scenario space that combines both key points out the content and game design analysis. The scenario space of essence and influence was originally introduced by sociologist Frederik Polak (1973), who expressed the node of essence in form of the general undertone of an imagined future versus the influence in form of how capable an individual or collective is in shaping the future to a desired form. Stuart Candy (2017) translated this into a two-axis table, using it as tool for evaluating ideas about the future. Furthermore, the axis of essence was enriched by the notion that positive and negative are understood more as mainly positive or mainly negative, allowing

fluctuations for a more holistic nature, as “[a] more realistic and complex spectrum seemed more useful for participants than a simple good-world/bad-world dichotomy” (Candy, 2017 p. 7). Additionally, he extended the definition for the influence axis to influence through people (optimism) or influence by “larger forces – physical, political, cultural and spiritual, to mention a few” (Candy, 2017 p. 8) which would act as a pessimistic factor on the influence, as citizens feel powerless over development.

These definitions were used to map the games onto a two-axis graph, additionally distinguishing between mainstream and indie games. To further visualize the distribution of future types within the games, for each of the four quadrants the future types from Hunt et al. (2012) were applied.

#### 4.8 Reliability, validity and suitability

The reliability for the content achieved through the interviews can be considered higher than for the information obtained for the game’s analysis. As the information for the games content was partly obtained through Wikipedia, the reliability remains limited, as a certain bias or negligence of information might be possible. Not all games have been evaluated by playing them myself, therefore a certain unreliability is expected. Additionally, the design of the analytical framework requires the classification of games into different categories with the probability of creating biases or inaccuracies. However, this is counteracted by the extensiveness of the framework, backed up by a collaboration with researchers as well as academic foundations for the framework. The subjectivity of the interviewees on the topic reduces the reliability of the results, however this impact was minimized by including a variety of interviewees from different areas and expertise.

As the type of this research is explorative, aiming to gain the greatest possible insights into the field, the chosen method for game content analysis proved itself to be of high validity. The design of the analytical framework as well as its wide scope allows to comprehend each game in its unique setting, while preparing the data to make comparison and abstractions possible. Additionally, the aim to involve actors from different areas of the field of commercial games enabled this research to consider different perspectives that create a balance between the results and allowed to comprehend influencing factors of the game sector.

## 5. Results

The data generated with the framework for evaluating commercial games as well as the results from the interviews will be discussed in the following chapter.

### 5.1 Future possibility space

The main points this analysis touches upon are the types of futures depicted in games, the game design, content details and an integration of the main data points into a visualization. The results from the analysis can be seen in table 4 and will be discussed in the following section.

Table 4: Results of games' analysis, sorted by indicators

Indicator	Results	Number of games	% of games analyzed
<b>Future types</b>			
Futures types by Hunt et al. (2012)	Markets forces	19	27,1
	Policy reform	3	4,2
	New sustainability paradigm	1	1,4
	Eco-communalism	0	0
	Fortress world	16	22,8
	<b>Breakdown</b>	<b>29</b>	<b>41,4</b>
	Unspecified	3	4,3
Typologies of dystopias in games (Farca, 2018)	Critical utopia type 1	9	12,8
	Critical utopia type 2	8	11,4
	Critical dystopia type 2	9	12,8
	<b>Critical dystopia type 1</b>	<b>25</b>	<b>35,7</b>
	Classical dystopia	8	11,4
	Anti-utopia	11	15,7

Future theme <i>Explorative</i>	<b>Advanced technology</b>	<b>27</b>	<b>18,9</b>
	Alien invasion	11	7,7
	Collapse of society	18	12,6
	Consequences of capitalism	14	9,8
	Environmental degradation	11	7,7
	New colonization	9	6,3
	Oppressive governments	10	7,0
	Space travel	11	7,7
	War	21	14,7
Unspecified	11	7,7	
Threat type <i>Explorative</i>	Environmental	10	14,2
	<b>Human-induced</b>	<b>44</b>	<b>62,8</b>
	Imaginary	11	15,7
	Medical	2	2,8
	Not specified	4	5,7
Game design			
Game type	<b>Mainstream game</b>	<b>48</b>	<b>68,5</b>
	Indie game	22	31,4
Genre	<b>Action</b>	<b>28</b>	<b>40</b>
	Role playing	26	37,1
	Simulation	8	11,4
	Strategy	11	15,7
Game mechanics <i>Explorative</i>	Colony building	8	11,4
	<b>Combat</b>	<b>42</b>	<b>60</b>
	Creation	4	5,7
	Decision making	13	18,6
	Exploring	13	18,6
	Puzzles	16	22,8
	Stealth	9	12,8
	Trivial / daily life	1	1,4

Perspective	<b>3D</b>	<b>43</b>	<b>61,4</b>
	2D	23	32,8
	2 ½ D	4	5,7
Scale	<b>Local</b>	<b>45</b>	<b>64,3</b>
	National	5	7,1
	Global	12	17,4
	Cosmic	10	14,3
Protagonist type <i>Explorative</i>	Civilians	10	14,3
	Manager	9	12,8
	Rebels / Scavengers	6	8,5
	<b>Soldier</b>	<b>16</b>	<b>22,8</b>
	Scientist	8	11,4
	Worker	12	17,1
	Unspecified	7	10
Protagonist value <i>Explorative</i>	<b>Hero</b>	<b>37</b>	<b>52,8</b>
	Smaller scale goals	6	8,5
	Survival	11	15,7
	Indeterminate	13	18,5
Antagonist <i>Explorative</i>	<b>Personified</b>	<b>37</b>	<b>52,8</b>
	Non-Personified	33	47,1
Agency over outcome: by protagonist	<b>High</b>	<b>29</b>	<b>41,4</b>
	Medium	18	25,7
	Low	24	34,3
Agency over outcome: by player	High	11	15,7
	Medium	22	31,4
	<b>Low</b>	<b>38</b>	<b>54,3</b>
<b>Content</b>			
State of ecosystems	Intact	15	21,4
	Degraded	19	27,1
	Destroyed	16	22,8
	<b>Unspecified</b>	<b>26</b>	<b>37,1</b>

Agency of nature	<b>Static</b>	<b>56</b>	<b>80</b>
	Responsive	5	7,1
	Adaptive	6	8,5
	Purposeful	3	4,3
System of planets	<b>Earth and moon</b>	<b>37</b>	<b>52,8</b>
	Multiplanetary	33	47,1
Human life <i>Explorative</i>	New colonies	10	14,3
	Human vs. human	7	10
	Oppression	25	35,7
	<b>Humanity (mostly) destroyed</b>	<b>28</b>	<b>40</b>
Geopolitical relations <i>Explorative</i>	Anarchy	8	11,4
	Hegemony	9	12,8
	International cooperation	16	22,5
	<b>Tense relationship between countries</b>	<b>25</b>	<b>35,7</b>
	War	5	7,1
	Unspecified	13	18,6
Forms of governments	Anarchy	8	11,4
	Autocracy	12	17,1
	<b>Democracy</b>	<b>19</b>	<b>27,1</b>
	Oligarchy	14	20
	Unspecified	16	22,8
State of economy	<b>Market economy</b>	<b>38</b>	<b>54,3</b>
	Market socialism	5	7,1
	Planned socialist economy	8	11,4
	Subsistence economy	10	14,3
	Unspecified	9	12,8
Role of technology <i>Explorative</i>	Threat	23	32,8
	<b>Support</b>	<b>31</b>	<b>44,3</b>
	Panacea	7	10



### 5.1.1 Future Types

The analysis of the possibility space of futures within games mainly pointed towards the prevalence of rather dystopic types of futures with a few exceptions. Notable findings regarding the different futures types within games can be drawn from the typologies of futures by Hunt et al. (2012). The most common future theme found was breakdown (n=29, 41,4%). An example of this future type is the game *Soma*, that shows a post-apocalyptic world in which the protagonist realizes that human consciousness has only survived in robots. An example for fortress world (n=16, 22,8%) is the game *Mirror's Edge*, where the protagonist is an undercover courier, delivering message off the government radar. Markets forces were both represented 16 times. Policy Reform (n=3, 4,2%) was rarely represented in the games and eco-communalism was not represented at all. A new sustainability paradigm (n=1, 1,4%) was shown in the game of *Stardew Valley*, a game in which the player can choose to pursue a life in balance with the local environment around him. The future typology was not specifiable in a few games (n=3, 4,3%), as for example in the game *Subnautica*, a game revolving around the survival in a submarine on a foreign planet.

The distribution of Farca's (2018) dystopian typologies matched the results of the previous future types, with all dystopian categories summed, namely critical dystopia type 1 (n=25, 35,7%), critical dystopia type 2 (n=9, 12,8%), classical dystopia (n=8, 11,4%) and anti-utopia (n=11, 15,7%) together accounting for 75,6% of all games. Additionally, the number of games within the critical dystopia type 1 category scored the highest, which is congruent with the high number of games showing the future type of breakdown. An example for this the *Portal* series, in which the player is stuck in a research facility and has to compete against an increasingly hostile artificial intelligence. A critical utopia type 1 (n=9, 12,8%) was shown in the game *Transistor*, as a seemingly utopic world that is threatened by a hostile artificial intelligence. Critical utopia type 2 (n=8, 11,4%) was identified in the game *Rim World*, a space colony building game.

When categorizing the future themes in the games, multiple themes at once could be found in the games. The most reoccurring theme was advanced technology, which was featured in 27 games (n=18,9%), for example in the game *Enslaved: Odyssey to the West*, in which the two protagonists are trying to survive in a post-apocalyptic world dominated by aggressive robots that are enslaving humans. The other less common themes identified were alien invasion (n=11, 7,7%), collapse of society (n=18, 12,6%), consequences of capitalism (n=14, 9,8%), environmental degradation (n=11, 7,7%), new colonization (n=9,

6,3), oppressive governments (n=10, 7%), space travel (n=11, 7,7%) and war (n=21, 14,7%). In 11 games, the theme was not specifiable (n=5,7%).

The threat types identified in the games indicate that 62,8% of the threats in a future game world are human-induced (n=44) such as *Metro 2033*, in which nuclear war has turned the globe into radioactive wastelands. Threats that were not caused by human misbehavior are captured by the category of environmental (n=10, 14,2%), imaginary (n=11, 15,7%) and medical (n=2, 2,8%), ranging from pandemics to other types of harmful medical events as in the game the *Talos Principle*, where humanity succumbed to a deadly virus.

Table 5: Further specification of Human-induced threats by introduction of new indicators

Indicator	Number of games	% of games analyzed
War and Conflict	14	20
Distressing the Planet	6	8,5
Harmful Technologies	17	24,3
<b>Social Inequalities</b>	<b>19</b>	<b>27,1</b>

Due to the high number of threats being human-induced (n=62,8%), a further specification was added subsequently (table 5). Out of the human-induced threats, war and conflict are themed in 14 games (n=20%), for example *Homefront*, where a war resulted out of political tensions. Another human-induced threat is distressing the planet (n=6, 8,5%) and thereby putting planetary systems in distress, for example in *A New Beginning*, where scientist travel back in time to change the use of fossil fuel energy to a sustainable commodity. An example for harmful technologies (n=17, 24,3%) is the *Mega Man Zero* series, which resulted in a war between robots and humans. Social inequalities (n=19, 27,1%), in form of oppressive governments or corporations were featured in games like *Papers, please* where the player acts as a border guard and has to make decisions of either sending away or letting immigrant and refugees into the country with either personal or public consequences.

In summary, these results show a predominance of the future type of breakdown as well as preponderance of critical dystopia type 1. The theme, that was found most often was advanced technology and the most occurring type of threat was human-induced, most often through social inequalities.

### 5.1.2 Game design

The analysis of commercial games concluded that out of the 70 games, 47 (n=68,5%) are mainstream games and 22 (n=31,4%) categorize as indie games. Examples for mainstream games are *Sim City*, *Eve Online* and *Borderlands*. Examples for indie games are *Factorio*, *Transistor* and *Starbound*.

With one of the main differences of indie games being creatively more independent and having a more distinct target audience (Garda and Grabarczyk, 2016), differences and similarities between these categories for the future type distribution were further examined. The analysis resulted in a shift of future types, with breakdown being less common in indie games (n=6, 26,1%) than in Mainstream games (n=23, 48,9%), see table 6. The future type distribution for indie games shows more variations in the distribution than mainstream games, which is visualized in figure 2.

Table 6: Differentiating between indie and mainstream games on the indicator of future types by Hunt et al. (2012)

<b>Indicator Mainstream games</b>	<b>Number of games</b>	<b>% of games analyzed</b>
Markets Forces	12	25,5
Policy Reform	2	4,2
New Sustainability Paradigm	0	0
Eco-Communalism	0	0
Fortress World	9	19,1
<b>Breakdown</b>	<b>23</b>	<b>48,9</b>
Unspecified	1	2,1
<b>Indicator Indie games</b>	<b>Number of games</b>	<b>% of games analyzed</b>
<b>Markets Forces</b>	<b>7</b>	<b>30,4</b>
Policy Reform	1	4,3
New Sustainability Paradigm	1	4,3
Eco-Communalism	0	0
<b>Fortress World</b>	<b>7</b>	<b>30,4</b>
Breakdown	6	26,1
Unspecified	1	4,3

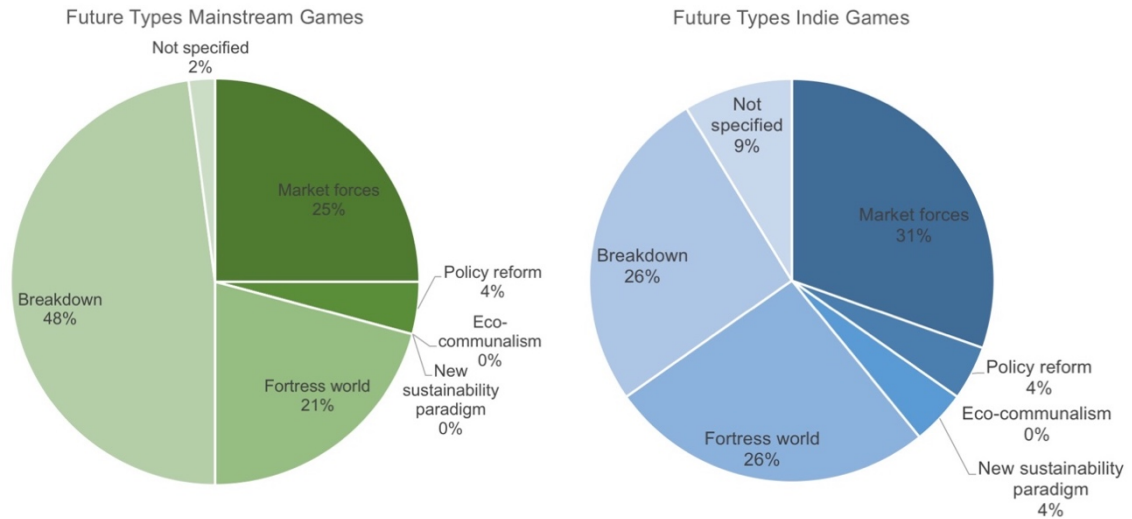


Figure 2: Future Types by Hunt et al. (2012) applied to Mainstream and Indie games

The next indicator genre showed a somewhat a predominance of action games (n=28, 40%) such as *Alien Swarm*. Role-playing (n=26, 37,1%) was seen in *Deus Ex: Human Revolution*, strategy games (n=11, 15,7%) like Factorio and lastly simulation games (n=8, 11,4%) like *Cities: Skylines*.

Furthermore, most (n=42, 60%) of the analyzed games featured combat elements as their main game mechanics. The second most common element was solving puzzles (n=16, 22,8%), followed by decision making (n=13, 18,6%) and exploring (n=13, 18,6%), stealth (n=9, 12,8%), colony building (n=8, 11,4%) and trivial / daily life (n=1, 1,4%).

The analysis of the perspective resulted in a majority of the games to be in a 3D perspective (n=43, 61,4%). A 2D perspective was found in 23 games (n=32,8%). The least games were designed in 2½ D perspective (n=4, 5,7%)

The scale measured how many people are affected by the threat of the game. The majority of games showed local scales of impacts (n=45, 64,3%), for example *A Story About My Uncle*, in which the protagonist goes on a personal journey to deal with the loss of a family member. Fewer games had a national impact scale (n=5, 7,1%), global (n=12, 17,4%) and cosmic impact scale (n=10, 14,3%). Examples for the global scale are games like *The Division*, *Metro2033* or *Xcom: Enemy Unknown* which introduce threats into the game that will have an effect on the entire population.

Next, the protagonists and antagonists were more closely analyzed. Various different protagonists' types were found in the analysis, however, the majority of the games protagonists appears to be either soldiers (n=16, 22,8%) or workers (n=12, 17,1%) like in the *Stanley Parable*, the player experiences the game world through the eyes of Stanley, a regular office employee. In other games the protagonist is a bartender (*VA-11 Hall A: Cyberpunk Bartender Edition*), a border control guard (*Papers, please*) or a state installed landlord (*Beholder*). The protagonists were characterized as civilians (n=10, 14,3%) with no explicit skill or function, for example in the game *This War of Mine*, were a group of people tries to survive in city during an ongoing war. The player functions as the manager (n=9, 12,8%) of the game world in by being the major of a city or controlling the construction of building a new colony like in *Sim City* and *Oxygen Not Included*, respectively. Rebel / scavengers (n=6, 8,5%) were themed less often as well as scientist (n=8, 11,4%). Seven games featured an unspecified protagonist (n=7, 10%) in a position of neither having a clear skill (soldier, worker, etc.). Examples for these games are *Flower*, where the player stirs a flower petal through the environment.

The ulterior motives of the protagonist, called here the protagonist value, showed that most protagonists can be identified as the hero type (n=37, 52,8%). In these games the protagonists were displayed as saviors, changing the outcome of the narrative or preventing a catastrophe. These types of games feature a player versus the world narrative, in which the characters' actions were responsible for preventing catastrophes. Examples for this category are games like *The Surge*, *Prey* or *Half Life*. Smaller-scale goals (n=6, 8,5%) aim to save or complete a mission that is noticeably smaller scaled than the other counterparts of protagonist values. For example, in the game *Inside*, the player controls a boy while walking through a bizarre world, ultimately saving an undefinable creature with no clear explanation of how and why. Survival (n=11, 15,7%) as the protagonist's motivation depicted either the aim of pure survival, like in *Metro 2033* or sustaining a new colony, as for example in the game *Surviving Mars*, where colonizing planet Mars is the goal of the game. Lastly, the protagonist value was indeterminate (n=13, 18,5%) in a few games, picturing a protagonist with no clearly identifiable goal, that could both show positive as well as negative behavior. For example, in *This War of Mine*, the player controls a group of civilians trying to survive an ongoing war with the need to scavenge for food and weapons, by either only taking abandoned supplies or stealing it from other survivors, rebels or soldiers.

It was not possible to clearly identify all antagonists in the analyzed games, as they were often portrayed very vaguely and were not further described. Therefore, the categorization consists of either personified (n=37, 52,8%) as in *Wolfenstein: New Order*, *Impossible Creatures* and *Portal* or non-personified (n=33, 47,1%) including *Frostpunk*, where the force working against the player are the harsh weather conditions in which a new colony has to be build.

The agency over the outcome describes the capabilities of either the character in the game or the player to influence the outcome of the story. A high influence of the protagonist (n=29, 41,4%) was the most common scenario within the analyzed games. This category signals a high involvement and dependency of the development of the narrative / story in the game by actions of the protagonist or multiple protagonists. Actions that fit this category are such as preventing global catastrophe, as in *A New Beginning*, where travelling back in time and preventing a certain action leads to saving the present and future. A medium influence (n=18, 25,7%) was seen in the game *Stardew Valley*, where the protagonist has the ability to influence on a local scale, impacting the local community and environment. A low agency over the outcome (n=24, 34,5%) is characterized through a more passive role of the protagonist, or actions that don't have impact on a bigger scale. An example for this is *VA-11 Hall A: Cyberpunk Bartender Edition*, where the protagonist listens to the stories of her guests in a bar, merely trying to elicit more details about the stories of the guests.

On the other hand, the agency over the outcome by players scored comparatively low in contrast to the agency of protagonists. More than half of the games featured a low impact (n=38, 54,3%). Games of this category cannot be influenced by the actions a player makes. The storyline can be followed, but not altered. For example, in *Portal 1 and 2* the player can follow the story of the game but is not given the opportunity to act differently. A medium agency (n=22, 31,4%) can be seen in the game *The Surge*. Here, the player is given the option to decide over the actions of big project called Project Utopia, aiming to save humanity by stabilizing the atmosphere to let ecosystems recover. A high player agency (n=11, 15,7%) describe outcomes of games that can be greatly affected by the behavior of the player. For example, *Deus Ex: Human Revolution* in which the player actively has to make multiple decisions in the game that influence the outcome of the game strongly.

These results suggest, that most of the analyzed games were mainstream games that showed in context with the future types of Hunt et al. (2012) a difference of distribution, with mainstream games tending towards having more fortress world as well as breakdown types of futures compared to indie games. Moreover, most of the games were action games and the game mechanics were most often that of combat. The majority of games were set in a 3D local setting with a protagonist in form of a soldier, being in the position of the hero of the story with a high agency of the games character and concurrently a low player agency, indicating a predominance of linear storylines in the analyzed games.

### 5.1.3 Content

Multiple types of systems were displayed in the number of analyzed games. The majority of games showed an unspecified ecosystem (n=26, 37,1%) like in the game *Beholder*, where the player functions as a landlord and the environment is mostly not depicted. This is followed by a degraded (n=19, 27,1%) and destroyed state (n=16, 22,8). The least games showed an intact ecosystem (n=15, 21,4%).

The agency of nature was mostly represented as static (n=56, 80%), as for example in the *Talos Principle*, where the role of nature is peripheral. A responsive (n=5, 7,1%), adaptive (n=6, 8,5%) or purposeful (n=3, 4,3%) depiction on nature was mostly underrepresented within the games.

The system of planet was either depicted as Earth and Moon (n=37, 52,8%) or as Multiplanetary (n=33, 47,1%), if the future types is including space exploration or not.

The way human life was depicted resulted in four main types. The most prominent one was humanity (mostly) destroyed (n=28, 40%) in which only pockets of humanity survived catastrophic events, or the entirety of humanity has been wiped out. An example for this is *Chrono Trigger*, in which only small groups of people are struggling to survive against destroyed food sources and aggressive robots. Oppression (n=25, 35,7%) appeared either in the form of strong corporations that directly impacted the living quality of humans, or oppressive regimes. In the *Stanley Parable*, human life appears to be contributed to corporations, deluding the protagonist in the game to have free choices and a free will, with no way of escaping this system. The oppressive regimes were characterized with different emphases, ranging from military regimes, that held citizens as prisoners, to authoritarian surveillance regimes, that forbade citizens to lead a life in freedom, to humans living as prisoners and being biologically altered in order to prevent procreation.

An example for this is *Dead Space*, in which human colonies on a foreign planet have formed a strong 'space' religion that dictates the way of living. The category of new colonies (n=10, 14,3%) depict humanity in a new setting, either through themes like travelling through space and colonizing new planets or building new colonies on planet Earth after (unspecified) fatal events. In *Horizon Zero Dawn* a few pockets of humanity survived that turned against each other while being threatened by increasingly hostile robots. Another theme was human vs. human (n=7, 10%). Rivalry arises in these games when humans are left in critical situations. This can be seen in *Fallout: New Vegas* or *Eve Online*. In *Deus Ex: Human Revolution* the differences between humans were created through different availabilities of body enhancements, that created tensions in society.

The geopolitical relations in the games were summarized into six categories. In eight games no form of geopolitics existed, categorized as anarchy (n=11,4%). Either it had global governments that collapsed, like in *The Surge*, or the population had been reduced to a few tribes with no rules and institutions in place, as in *Horizon Zero Dawn*. In some of the games, geopolitics were displayed as hegemonies (n=9, 12,8%), with one nation or one group of people holding the political power over the planet. This included oppressive military regimes (*Beyond Good & Evil*), aliens ruling over humans (*Half-Life 2*) or world domination through powerful mega corporations (*Invisible Inc.*). International cooperation (n=16, 22,5%) was characterized through intergalactic democratic governments as in *Mass Effect* or the transnational government 'Alterra' in the game *Subnautica*. The category of tense relationships between countries (n=25, 35,7%) encompasses all games that feature a strained relationship between two or more nations. War was specifically themed in five games (n=7,1%). *Immortal Unchained* featured a war between different races and *Freedom Wars* contained a global war fought between fictitious nations. Lastly, 13 games had an unspecifiable geopolitical setting (n=18,6%) which made categorization not possible.

Next to the geopolitical relations, the forms of government gave insight into how the society depicted in a game was functioning. Democracy (n=19, 27,1) was identified most, as for example in the game *Transistor*. The other types are anarchy (n=8, 11,4%), autocracy (n=12, 17,1%) and oligarchy (n=14, 20%). A number of games were categorized as unspecified (n=16, 22,8%) like *Oxygen* not included were the player build a space colony on an asteroid.



The analysis of the state of economy showed that market economy types are overrepresented (n=38, 54,3%) within the analyzed games. Examples for a market economy, are shown in the game *Invisible, Inc.*, in which a small number of mega corporations are in control of most resources and production. An example for market socialistic economies (n=5, 7,1%), are games like *Sim City* or *Cities: Skylines*, where not only the economic gains play a role while managing a city, but also the well-being of the citizens as this has direct consequences on the gameplay. A planned socialist economy (n=8, 11,4%) can be found in *Mirror's Edge*, in which the state slowly transforms into an authoritarian state and the economy with it. A subsistence economy (n=10, 14,3%) is found in *Fallout: New Vegas*, where after the destruction through a nuclear war a trading system between survivors develops. Games like *Beyond Good & Evil* fall in the category of unspecified (n = 9, 12,8%), as the game setting does not clearly outline which type of economic system is in place.

The depiction of technology can be split into three categories: technology as a threat, technology as support or technology as the panacea. Technology as a threat (n=23, 32,8%) is granting power and advantages for the antagonists as in *Wolfenstein: New Order*, hence creating a threat. In almost half of the games (n=31, 44,3%), technology had a supporting role for the protagonists. This support may be in form of rural technologies for new colonies, like in *Frostpunk* or *Oxygen Not Included*. Here technology plays a minor role regarding its importance for the outcome of the narrative. In a few games, technology is displayed as a panacea (n=7, 10%), that enables the prevention of catastrophes and, in most cases, the possibility of saving humankind as in the game *Transistor*, where the whole environment can be created and shaped using technology.

To sum up, the state of ecosystem was unspecified in most games with representing nature as static. The system of planets was most often show with the Earth and Moon. The human race was predominantly shown as mostly destroyed, with tense relationships between countries, forms of democracy and a market oriented economic system. Technology was frequently in the supporting role.

#### 5.1.4 *Integration of future types and game design*

The results of the future types and the difference between indie and mainstream games with mainstream games marked as blue and indie games as green (with the distribution of games indicated in percent) were gathered and projected onto the essence and influence matrix, visualizing the overall tendency of optimism or pessimism, as well as the player's

ability to determine the outcome of the game (see figure 3). The main findings of the analysis show a difference between the distribution of future types within indie games and mainstream games, with the largest differences in the category of breakdown, in the top left quadrant of essence pessimism and influence optimism. 39,5% of the mainstream games are located in an essence pessimism setting, with the ability of the player to improve the situation through the protagonist, as the location of influence optimism indicates. In contrast, only 9% of the indie games held the same future type within the same quadrant. In contrast, the bottom left quadrant, showing a dystopic future with no influence by the protagonist to change the outcome was less often identified. More indie games than mainstream games were located in this quadrant, mostly showing future types of fortress world or breakdown. Alternatively, both quadrants on the right, indicating futures with a positive essence were underrepresented. The top right quadrant held future types of mainly market forces and policy reform. The only game that featured a new sustainability paradigm is located in this quadrant. Games that would fall in the bottom right quadrant were underrepresented in this analysis.

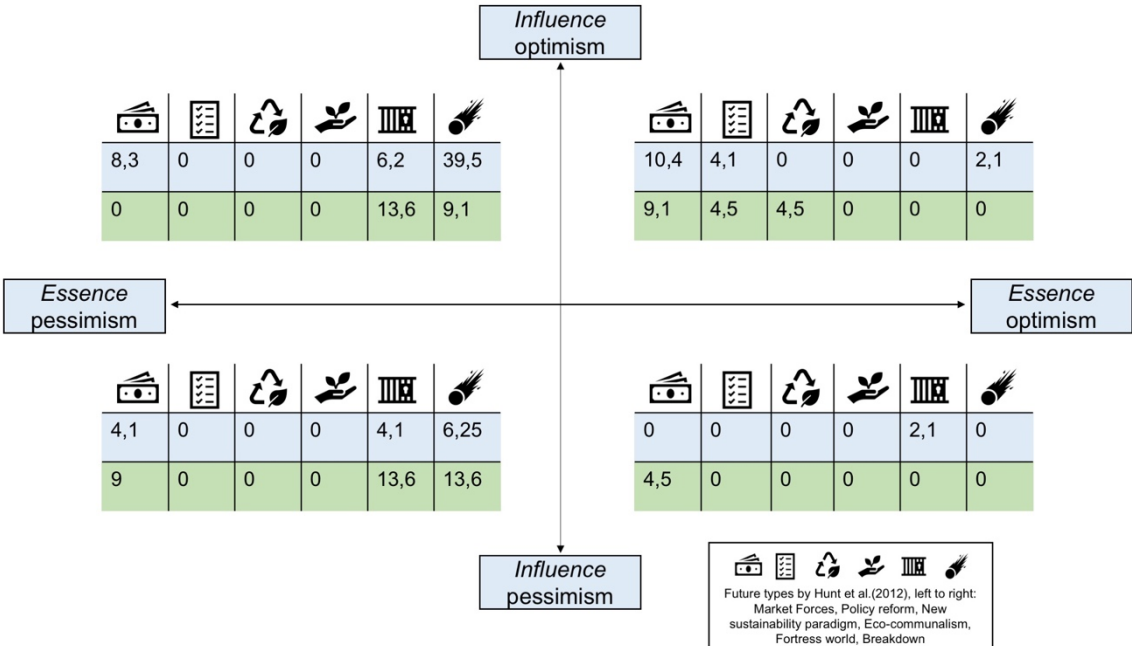


Figure 3: Distribution of games, divided into mainstream games (blue) and indie games (green) in the scenario space of essence and influence (Candy, 2017) and future types by Hunt et al. (2012) with relative numbers in percent

## 5.2 Interviews

In the following, the interviews will be evaluated, based on the interview guide (see appendix 11.3). The main results are summarized in table 7, showing the identified drivers and barriers to diversify the game sector.

Table 7: Barriers and drivers for diversifying future in games from interview results

	<b>Game sector</b>
<b>Drivers</b>	Diversifying target audience
	Diversifying workforce
	Changes in funding
	Increasing communication between developers and players
	Diversifying game mechanics (moral decisions)
	Technological advancements (Unity)
	More creative freedom through indie games
	Escapism
<b>Barriers</b>	Economic pressure
	Lack of imagination
	Complexity of narrative
	Familiar conflict (stock dystopias)
	Fascination with dystopias
	Consumer demand
	Homogenous target group and workforce
	Escapism

### 5.2.1 Representations of futures in games

Most interviewees collectively described the current commercial game sector in a similar way. A game studies teacher (T1) mentioned the prevalence of most commercial games to follow a certain storyline that usually paints a world clearly dividable between good and bad, justifying the actions of the games' protagonist. Especially mainstream games would draw a clear line between the threat humanity is facing and the need and justification of the protagonists' actions, which was confirmed by an interviewee who is a Youtuber (Y1), making 'Let's play' videos focusing mostly on mainstream first person action games. Participants of the Duckfeed forum (G1) added that a clearly sketched picture of either an oppressive government or corporations holding power over nations is a common theme as well as similarities between early science-fiction literature such as Orwell's 1984 or

works of H.G. Wells as the base layer for constant exhaustion of ideas rather than the creation of new worlds or futures.

The threats that are depicted are usually especially grim and of extreme scale, in contrast to futures that could result out of a more gradual change in a not so distant future. In this context the interviewee T1 mentioned the game *Horizon Zero Dawn*, that depicts a post-apocalyptic world with only a few tribes of humans surviving, resulting from technology in form of robots that started turning against humanity. That the conflict is usually immediate was also noticed by a game studies developer (DEV1), who added, that most conflicts in games are also based on information inequality, where power can accumulate by having an advantage through knowledge over other parties. A participant from G1 experienced that most games would often show dystopian worlds with totalitarian regimes and landscapes being turned into wastelands. The second interviewed Youtuber (Y2) added that there might be a morbid fascination with collapsed cities and post-apocalyptic worlds, in which nature regains its power and human-build constructions slowly wither away. The prevalence of dystopian post-apocalyptic worlds was also mentioned by a game publishing studio (P1). A researcher working in the field of social imaginaries (SI2) also described the commercial game sector as depicting dystopian worlds that only focus on some aspects of possible futures.

The predominance of an overpowered protagonist with the ability to stop or prevent large scale catastrophes was mentioned by DEV11. This 'classical hero' is often the protagonist form of most commercial games, putting the player in a position of total success upon completion of the mission (Y1).

A reoccurring theme that was noticed by a number of participants was the peculiarity of highly technical futures. Futuristic appearances were described as appealing to the audience (G1). Furthermore, this theme was criticized by a female designer working for an indie game studio (DESI1), as she experienced it as only targeting a specific group of players, which mostly covers young men with a technical affinity. She expressed that this was especially pronounced in the mainstream game sector. This was also described by a female researcher working among other topics on the anticipatory use of serious games (RS1) as well as a scenarios expert (SE1). RS1 mentioned, that speaking from her personal opinion, she does not feel included into the target groups of most big games, as they focus so strongly on technical science-fiction futures that it does not interest her.

Overall, the participants' answers reflected a picture of the game sector that correlated with previous findings in the literature, indicating a predominance of dystopic futures (Vervoort, 2018), that are predominantly painting a highly technical picture of the future, aimed at specific target audience.

### 5.2.2 *Intrinsic value of games*

Games may hold a special value in comparison to other types of media, as they have the ability to engage players with the protagonist and the game setting more substantially. RSI2 explained, that the connection a player builds with the protagonist can be very strong, as the player experiences the game world through the character itself. Through these interactions, in some games coupled with choices and consequences of players' decisions, a much more impactful relationship can be established, that differs from the connections resulting out of books and movies (RSI2). This phenomenon was noticed by interviewee Y1, when playing the game *The Witcher 3* in which he described a situation, that required him to make a decision that would have an impact on the game development. Making a decision resulted in the death of one of the characters in the game, that brought unintended consequences and regret to the interviewee Y1. He expressed, that he was fascinated by the extent of the impact this event had on him and that this experience was something unique he had not encountered by consuming other types of media.

Next to the uniqueness of games to engage the players with the protagonists, games can immerse the player with the game world and make them acquainted with the parameters, which also makes it a highly interesting subject for research (RS1). For players, a game can function as a safe space to test different scenarios of futures (RAG1). A future world that is displayed by a game can engage the player by introducing game mechanics that hold future aspects, involving the player into the future theme the game creates (RS3). This however depends strongly on the quality of the game in regard to its ability to involve players (RSI2).

To conclude, the interviewees understood games as an important field to study the potential influences on players through the possible immersive effect, as they learn the games parameters and rules and sympathize with the protagonist with this factor enhanced when in-game decisions are introduced.

### 5.2.3 *Relationship between futures portrayed and future social imaginaries*

The relationship between games and their effect on imagining futures was considered crucial by all of the researchers interviewed. RSI1 expressed that games could hold the opportunity to engage players with concepts of the futures, especially when set in very far and distant futures, which allows for experimentation with thoughts and ideas. Moreover, RAG1 explained that games could have explorative environmental potential for neglected future types. This would grant transformative power as they can diversify future imaginaries, although this is difficult to measure. On the other hand, from the perspective of anticipatory governance, channeling players into a direction of primarily undesirable futures is negatively impacting the goal of working towards concepts of desirable futures (RAG1). Additionally, the overrepresentation of some future types might narrow down the diversity of imaginations, said scenarios expert's interviewee SE1, as this is comparable to unilaterally back casting futures, a technique used in the field of future studies, which does not educate consumers about other possibilities and outcomes of futures. Another researcher from the field of social imaginaries (SI3) added that limitations of social imaginaries are most probable impacting players, but they are hardly measurable and should be more understood as a cultural undercurrent, that influences society by shaping social imaginaries. Parallel to this, interviewee SI1 mentioned the influence science-fiction literature has had on influencing society, especially in terms of the ability to imaginatively experiment with different futures. Science-fiction could be understood as a tool to help visualize futures in the broader public, and games may hold a similar value.

However, other types of media are getting increasingly unimportant for younger generations, resulting in that some obtain their input of media only through commercial games (SI2). If the only source of media are grim dystopian games, then the social imaginaries of the younger generations could be impacted, and they might be less likely able to imagine futures that are outside the familiar scope. SI2 expressed, that the way media is conveying lifestyles and values might have an impact on the social consciousness. In this context, two interviewees (RS2 and RSI1) stressed the need for comprehending the future as well as the present as something constantly changing, rather than something static that can be reached by a certain behavior. They claimed that the current narrative propagates a linear understanding of reaching the future, which may limit the possibility of more impactful changes.

#### *5.2.4 New futures in games imagined by participants*

When asking the interviewees for shifts in the game sector they would like to see or might be interested in, having non techno-optimist futures were mentioned by two participants. SI2 explained, that currently games would show technological advancements as the solution for imminent catastrophes with holding up technology as the 'holy grail' for all types of problems. This might be especially impactful for social imaginaries that are being conveyed through games, as they don't open up the imaginaries for solutions outside a technology scope (SI2). SI2 is currently working on a project which stresses the urgency to rethink lifestyle as well as value changes as an important motivator towards sustainable development. With games focusing solely on technology as the only salvation, important aspects for tackling future problems might be left unaddressed (G1).

Another theme a few interviewees would like to see, was more transitional approaches being taken up by games when displaying the future. Having societal or environmental tipping points themed in games, in which players have to make decisions that will result in different outcomes would be interesting both from a player's as well as researcher's perspective (SI2, RS1). Currently, games would usually hold futures that are either close, or already past a catastrophic event, without further definition of how it got to that point (DEVI2).

The results of this section suggest that the participants would like to see different futures reflected in commercial games that hold more transitional worlds and possibly shift away from the widespread techno-optimism seen in current games.

#### *5.2.5 Drivers of change*

In this section, potential drivers for diversifying futures in games by changing the game sector will be evaluated. Diversifying the target audience was mentioned by five interviewees to be promising in relation to diversifying game content and the futures they hold. The potential audience of games could be nearly everyone. A special focus has to be put on women and older players, that are currently not included in the target group mainstream studios are aiming for (RS1, SI1). An example for this mentioned interviewee DESI1, working in an indie game company that is specifically targeting people above 50 years old. They are aiming for simplified game mechanics and interesting game designs that prove to be appealing for this specific target group. The need to address a wider target audience was also acknowledged by RS3, Y2 and T1.

Diversifying the workforce was also considered to be beneficial for the game sector. Mentioned to be one of the main reasons for the outlook of the current landscape of futures in the game sector, a diversification of the workforce by decreasing the homogeneity of developers in the field of game development could help boost a change in topics and themes a game has to offer, and, for example, balance out the overrepresentation of technical futures (DESI1, RS3). This refers to decreasing gender ratio imbalances (DESI1, RS3) as well as diversifying academic backgrounds of game developers, with both benefitting from increased availability of amateur developing tools, that allow unskilled individuals to create games (Y2, RS3, DEVI2, DESI1 and TT1). Bringing individuals with different backgrounds together, for example artists and game developers, could also actively diversify the output of futures in games (TT1).

One influencing factor that might have a positive effect, is changes in funding. The possibility of kickstarting games or releasing them in early access versions, which are usually indie games in which a publisher is asking for financial support from the audience, enables game content that might not be marketable otherwise (DEVI2). This way, game publishers exert less and less influence over the content of games, as they have been more influential in the past (DEVI2). One-person developers also grant an interesting perspective, as these developers usually work for years on a project with seemingly less pressure from publishers and the market, claimed RS3.

Communication is deemed to play a significant role as well, for promoting change towards more diversified future types in the commercial game landscape. The communicative aspect also grants transformative power for game content, as this gives the audience the opportunity to shape their preference onto the games that they are supporting (Y1, TT1, RAG1). Giving more agency to the audience would benefit the reconstruction of the game sector, as by this the games and the futures they bear will become more diverse, with a broader audience able to communicate and participate (SI3). More communication can also include direct dialogue with developers via social media platforms that allow for discussion and feedback, with this already being common for the indie game sector but mostly being avoided by mainstream game companies (SI2).

Another crucial factor for gaining a variety of futures in games, was the diversification of game mechanics. The interviewees touched upon different points regarding this, most



often the possibility of having a more utopian game settings, or worlds that are in between utopias and dystopias. As many interviewees have pointed out, implementing more positive types of futures is difficult due to a lack of conflict a game needs to make it playable and interesting (G1, T1, DEVI2). However, some participants held the opinion that more positive futures or even utopian worlds could generate the necessary conflict as well (DEVI1, G1, DESI1). Additionally, two interviewees pointed out that having some a sort of mundane conflict, that reflects more on everyday life issues, as the basis for a game, would also be genuinely interesting to play (DA1, RS3). How successful games with more mundane rather than epic conflicts already are, could be seen on the examples of *Life is Strange*, where the player slips into the life of a college student, or the game *Farming Simulator*, where the tasks in the game itself revolve solely around farming (DA1, RS3). How different the need for a conflict in games may be implemented, can also be seen in so called zen-games, that put the focus on generating positive emotions and relaxation, such as games from the studio *Thatgamecompany*, who developed *Flower* and *Journey* (DA1).

Technological advancements may also have great potential for the advancements of the game sector. First of all, the further development of artificial intelligence may reduce resources for developing teams to increase decision trees into games, which as previously explained may hold the opportunity of enriching game content (T1, DEVI2). A second prospect is the further development of Unity, a developing software that could allow amateurs to develop games as well (Y2, RS3, DEVI2, DESI1 and T1). With this, the game sectors' content could become increasingly democratized (RS3).

Another way to diversify game mechanics would be to introduce more moral decisions and decision trees into games, as this would allow players to reflect on their in-game behavior (DA1, SI2, T1). This was also expressed by Y1, explaining that including moral decisions into games would also allow to integrate different future types, assuming that certain behavior would lead to different outcomes.

Another possibility might be a change within the game sector itself, with mainstream game studios or indie game studios experimenting with new settings that become successful and will then be taken up further by the game sector. With the resources and team sizes a mainstream game studio offers, new technologies could be developed that enable new possibilities (T1), whereas indie studios might invent new tropes of games (RS1, SI3).

At last, escapism might function as driver as well as a barrier, depending on how it will be used by the game sector. Escapism, in the form of distancing oneself from current societal issues, was considered to be potentially beneficial, as games could hold more desirable types of futures and still allow players to distance themselves from reality (SI2).

Overall, the results indicate a number of potential drivers (summarized in table 7) for diversifying futures in game with opportunities that require structural changes such as the workforce to more content related issues, as diversifying the main target audience.

### *5.2.6 Barriers to change*

The most often mentioned barriers of change were economic barriers, from the game developers' side. To diversify futures in games, more resources are needed to develop new narratives and games mechanics that make it a costly endeavor (T1, DEVI1, DEVI2, Y2, RAG1, SI3, TT1, P1). By using known and already familiar dystopic worlds, game developers and companies save a lot of resources, as time intensive processes such as narratives and world building processes can be limited (DEVI1, RAG1, RSI3). Developments in the past few years shifted mainstream companies to often publish game series, that are meant to stay on the market for 5 to 10 years, by improving and developing content add-ons to the base game. By doing this, a studio needs to produce worlds and narratives less often which results in slower changing themes for mainstream games (TT1). Especially mainstream game studios don't want to take the financial risks to develop something that is inherently different from what already exists (RSI2). Big studios would have the ability to shape the market and dictate consumer taste (TT1). Indie games, on the other hand, would often create games with a different mindset and passion to deliver a message through their game, which gives them a different creative position than mainstream companies (RSI2). However, indie game companies are still dependent on the market and therefore affected by economic pressures as well (TT1, RS3).

A lack of imagination can be observed in the current landscape of commercial games, claim multiple interviewees. Games would orientate a lot on movies and books, following up on narratives that already exist, rather than creating new content and imagining new types of futures (Y1, G1). Interviewee RS2 explained, that imagining desirable futures is very difficult, as most people find it easier to imagine a negative future than a positive one. Adding to this, interviewee SI1 described, that media, in this case games, would only hold a reflection of society, echoing cultural narratives and believes that are deeply ingrained into the games. RSI3 described the prevalence of some types of futures to be common for

the game sector, as “it appears to be stuck in its ways” (RSI13) with reoccurring conflicts resulting out of environmental or societal destruction as seen before in literary dystopias. A participant from the Waypoint forum G2 also compared the similarities of futures in games to movies, as they offer very limited original content that leans on narratives that have been created before. However, the lack of creativity to imagine new futures could also stem from the underlying issue, that the current social narrative limits the future imaginaries to especially excluding desirable futures (RS2). These limited imaginaries might function as a ‘mirror of society’ that echoes the current cultural narrative (RSI1) and they are continuously perpetuated by the media, which in turn limits the ability to imagine desirable futures again (RS2).

A more structural barrier that could be encountered when trying to diversify futures in games, could be the increase of complexity of narrative or ideology. Using familiar dystopian themes do not require further definition of parameters or plot by the developers (DEVI2). Creating new futures with a developer’s own ideologies, however, requires more complex developing processes (T1). It is for example much easier to imagine new worlds and futures in books, as here the individual parameters do not need to be defined so clearly and do not have to be visualized (T1, Y2). Especially aiming for futures in between dystopias and utopias would require defining the parameters and the narrative in the game even further (DEVI1). In this context, T1 mentioned the advantage of a familiar conflict a dystopia generates for a game. Conflict in some form is necessary for catching the interest of player for the game (RS2). An absence of conflict would result in a lack of a reward system, that was considered a crucial factor by the interviewee for gaming itself, “games are putting up arbitrary boundaries for yourself to overcome for a sense of accomplishment” (T1). These ‘stock dystopias’ that are often used for combat games were also recognized by an interviewee from G1. Dystopias offer this conflict in a form that makes it enjoyable for the player and easier for the developers as it is suited for protagonist versus the world type of conflicts (G1, T1). When for example creating an action shooter game were the narrative is secondary, using a dystopian setting around it that is familiar for the players simplifies the developing process, as the setting does not need to be exactly defined (DEVI2). One interviewee expressed that projecting peace in a game theme is both inherently difficult and uninteresting (G1), while a game developer argued, that pure positivity is not accomplishable for a game, as the players motivation might not be caught (DEVI1).

Some expressed the predominance of certain futures is caused by a fascination of dystopian future worlds, by consumers as well as developers, that are distant and not comparable to our current societies. The creative element of dystopian cities, or post-apocalyptic environments that show the human accomplishments vanishing, generates a morbid fascination that is being exhausted by the game industry (Y2). DA1 explained, that dystopias are exciting, as they let the player play with elements that are not possible to engage with in real life, without facing consequences for their behavior. A member of the *Duckfeed* community (G1) described a psychologically appealing dimension to this, as dystopias allow for game mechanics that enable a player-versus-the-villain type of construct, that usually puts the protagonist in a position of responsibility in which they have to prevent whole catastrophes.

Consumer demand was named by a few interviewees to be partially responsible for a lack of development in the game sector. Especially the newer generation of gamers, which is becoming the main target group for most mainstream studios, show less interest in complex narratives and worlds, but are more interested in multiplayer online games which put the narrative in an incidental position (Y1). The popularity of mainstream games and the lack of interest on the consumer side to engage with games that are outside the mainstream dystopias were also mentioned by an interviewee (TT1).

The importance of the currently primarily addressed target audience as a perpetrator for the overrepresentation of some future types, as well as a possible barrier for diversifying the game sector, was also stressed by a number of participants. DA1 mentioned, that from the standpoint of producing mainstream games, reaching most player types is a desired goal. These player types include gamers that are for example mostly interested in combat, collecting all items and hints, or stealth which can be combined when using a dystopian game setting. Some interviewees understood the target audience as too homogenous and game producers would mostly cater to young men with an interest in technical elements in a game, that could explain the predominance of grim dystopic futures types (T1, RAG1, RSI3). The community revolving games have become off-putting for potential audience that does not identify themselves with main target groups (SI1). This resulted in stereotyping of the gaming scene through events such as the 'gamergate', that sparked controversy for harassment and sexism which repels a widening of the audience from within the field (S1, RS2).

Keeping a homogenous workforce was considered to be disadvantageous for the diversification of the game sector. With young males being the main target group as well as the predominant group of game developers, the content remains affected by creative conservatism (SI1, T1). With developers and the target audience seemingly being locked in one area of game types, this would create a “chicken and egg” (TT1) type of situation. These structural reasons were also mentioned by RAG1 and RSI1.

A number of gamers however might be looking specifically for similar content in games, resulting from the phenomenon of escapism that preserves the tendency to homogenous content. Y1 explained, that he uses games specifically to unwind and seeks out ‘easy’ content with familiar dystopian themes that does not relate to his daily life. That this might slow down transformation within the game sector was also acknowledged to be a problem by interviewee SI2. Next to gamers not wanting to relate to current societal problems, the game studios itself aim for keeping political aspects out of the games, to increase the target audience (DESI1, DEV1, RS3, RS1). As a dystopia still serves as a commentary to today’s society, futures would only feed into loose and confusing scenarios that depict environmental or societal collapse, as for example nuclear wastelands or post-apocalyptic cities, without taking an actual position of causes and effects (G2).

To summarize the drivers and barriers, the results show that one often mentioned barrier was the role economic incentives are playing when shaping the future displayed in a game. Especially mainstream game studios are affected by this, as they tend to reproduce games that guarantee to be popular in their target group, hence themes within the games change slower and are less diverse. Though it was mentioned that indie game companies are also directed by economic feasibility, through changing means of funding (Kickstarter, early-access) this process plays a more limited role than for mainstream games. This mentioned difference between the output of indie game studios and mainstream studios was acknowledged by almost every interviewee to play a significant role in the types of futures a game holds, though both were still set in a cultural narrative that makes up the entertainment industry as a whole, directing the general narrative. Additionally, the significance of a homogenous workforce to explain the limited range of futures within the game sector was stressed by the interviewees. With the majority of individuals working in the game sector being young males that come with an affinity for science and technology, who are often themselves gamers, a homogeneity of content output is consequential. Another finding emphasized by both game developers as well as gamers, was the ability to use games as escapism from reality, purposely avoiding incorporating content that

makes it relatable to real life problems. Rooted in this, were statements of game developers and game designers both in indie- and mainstream companies, to remain unpolitical as a requirement for the further development of the game.

## 6. Discussion

The influence of commercial games on future social imaginaries around the theme of sustainability has so far been mostly neglected in the public and the scientific community, despite their immense and growing popularity. Current literature still lacks the understanding on the question of how commercial games exactly depict future worlds for assessing potential impacts on the future social imaginaries of its players. This thesis sought to map out and identify over- and underrepresented futures existing in games, indicating the boundaries and scope of futures within commercial games, with the assumption of a potential impact on the player's social imaginaries based on the literature suggesting an effect on the future social imaginaries through media as well as computer games (Farca, 2018; Tisdell, 2007). Lastly, this study concludes with the identification of barriers and drivers that might hinder or stimulate the diversification of futures within games for both the game sector as well as for academia.

In the following sections, the limitations of this research and the quality of the analytical framework will be discussed, followed by the most relevant findings regarding future types in games, game design and significant content results. This will then be examined for possible effects on future social imaginaries and ends with the discussion of the drivers and barriers of change for the game sector. Lastly, this discussion leads to implications for further research as well as giving recommendations.

### 6.1 Limitations

The games were analyzed based on the framework defined in section 4.4. Consequently, the quality of the concomitant results is dependent on establishment and effective use of this framework. The framework was designed to understand the games' futures from multiple perspectives and understand a variety of facets about the worlds they depict. The choice of using indicators closely defined by scholars and as well as choosing open indicators to assess the games, emerged from the aim to reduce subjectivity when classifying different aspects of games into categories. However, a certain level of subjectivity cannot be disregarded due to the necessity of classification in general, with several games being partly unspecifiable. To counterbalance possible wrongful classifications, the list of indicators included a number of open and closed classification categories to get a comprehensive idea about the type of future a game was displaying. The data generated from the framework must be interpreted with some caution because of the substantial number of findings that forced a selection of outcomes to discuss. Many

more important conclusions could be drawn from the data, possibly opening up further discussion of specific content displayed in games. However, the scope of this research was confined to examining key elements important for laying out a fundamental understanding of future type distribution within commercial games, with the potential to expand on this in more detail in further research.

To select games that are set in the future, rankings from both Steam and IMDb were considered that were specifically labelled for ranking science-fiction games by popularity. This already defines a certain type of future and excludes most games that hold non science-fiction futures. It is possible that more diverse images of futures in games exist outside the scope of analysis, however a specific 'future-related' classification is lacking on platforms like Steam, that would allow to search for more general games set in the future. Nevertheless, this study analyzed the current landscape of popular games and their futures landscape delivered to the players which reflects the aim of this study.

Furthermore, this research is limited by the composition of interview partners, as for example the sector of indie game developers is relatively overrepresented in relation to one interviewee for mainstream game development, compared to three from the indie game sector. Also, finding game publishers as well as mainstream companies in general proved difficult as especially this sector appeared to be strongly confined by time constraints. Participant imbalances between the sectors were reduced by considering all information obtained and identifying key findings via a content analysis that did not focus on frequency of results rather than plausibility.

Lastly, this research did not attempt to exactly measure the influence of commercial games on the future social imaginaries of the players but interprets it as a sub textual influencing factor on the player's imaginaries. Given the explorative nature of this project, the creation of a game database is to prove the assumption and draw conclusions to further test, expand and examine by the multiperspectivity of interviewees proves itself to be a suitable design for this specific research.

## 6.2 Futures in games

The results of the commercial game analysis indicated that the majority of commercial games feature dystopic futures. Adding up all games of the two essence pessimism quadrants (see figure 3, left quadrants), 68,5% of the analyzed games were showing a pessimistic world, confirming the hypotheses of a prevalence of dystopic future types,



based on Vervoort's (2018) work. The application of futures types by Hunt et al. (2012) onto the commercial games showed that the majority of games have the future type of either fortress world or breakdown, with a total of 58,5% of all games. Comparing these results of the distribution of both the future types by Hunt et al. (2012), and Farca's (2018) dystopian typologies, which indicate a predominance of critical dystopia type 1, showed that not only are the analyzed commercial games predominantly dystopic, they also often feature the bleakest type of dystopia (future type Breakdown). Additionally, the interviews resulted in pointing towards an overrepresentation of grim dystopic futures as well, often characterized by far reaching impacts for humanity and the environment.

In accordance with the present results, previous research has indicated that an overrepresentation of dystopic futures appears to be common within commercial games (Vervoort, 2018). However, a general understanding of dystopias in games as a unique characteristic, has so far not been acknowledged by most scholars (Farca, 2018). One possible explanation for the tendency of bleak dystopias may be a general dichotomic understanding of future types within games, lacking games that depict futures outside a purely dystopian setting. This dichotomy of how futures are seen in commercial games may be deeply engrained into the game sector, with scholars, developers and consumers alike having internalized these structures into their understanding of commercial games. The first can be seen on the example of Farca (2018), who introduced a classification of games that directly categorize them by the terms utopia and dystopia. The interviewed game developers and players also pointed towards a dichotomic understanding of the game sector, that is characterized by a dystopic understanding of futures in games. The game developers referred to a necessity of conflict for the game to function and generate excitement to engage players, as a possible explanation. In line with that, most of interviewed gamers disregarded the idea of utopic settings for games due to lack of excitement in 'peaceful worlds' (G1).

Another important finding was the lack of sustainable futures within games. With a total of three games showing a future world recognizable as Hunt et al.'s (2012) future type of policy reform, only one game showed the type of new sustainability paradigm and no game could be matched to eco-communalism. This indicates, that current futures in commercial games show little to no sustainable pathways or outcomes. One explanation to this could be a lack of imagination in the game sector, which was also pointed out by a number of interview partners. RS2 stated, that imaging desirable futures is much more difficult than imagining a negative or dystopic future. These findings support the work of Hajer and

Versteeg (2019), in their article '*Imaging the post-fossil city: why is it so difficult to think of new possible worlds?*' linking the issue to the collective shortcomings of imagining desirable futures, coined by awareness about current issues, and the inability to imagine futures past them: "Mediatization has become so pervasive that it leaves an imprint about how we conceive of our realities: we are unable to think beyond the circulating images" (Hajer & Versteeg, 2019, p. 129). The lack of imaginations beyond cities that are based on fossil fuels is comparable to the types of futures seen within games and their general absence of sustainable futures. These results corroborate the idea of Hajer and Versteeg (2019), who stress the critical condition of current (future) social imaginaries to be in a "crisis of the imagination" (p. 131). Alternatively, this could mean an opportunity for the game sector. With games being influenced and influencing futures social imaginaries, 'breaking the circle' by implementing games with more diverse types of futures could in turn encourage more games to be designed like this, strengthening the likeliness of using games as a pathway for sustainable development.

The results from the interviews indicate that this overrepresentation of dystopias and underrepresentation of sustainable futures reflects in the players capabilities to imagine desirable futures, as their future social imaginaries could be impacted by the homogenous future types present in games. However, despite these possible limiting factors on imagination through predominantly dystopic worlds, Farca (2018) argues, that the imaginative possibilities of players may not be impacted in this straightforward and limited manner and that other possibilities may emerge. He argues, that as long as a (dystopic) game gives the player the possibilities to thrive for utopic outcomes of the story, a lot can still be learned, as "[...] it involves [the player] in a *playful trial action (or test run)* in which [the player] may test, track and explore in detail an estranged gameworld and an alternative societal model through imaginative and ergodic means." (Farca, 2018, p. 16).

The game design analysis gives more insights into this phenomenon. These results show a great difference in the level of agency a player has to determine the outcome of a game, with a majority of games that grant the player only a few possibilities to influence the ending. The results indicate a predominance of Farca's (2018) critical dystopia type 1 futures, holding a pronounced orientation towards linear storylines that leaves the player without the confrontational effect of deciding over the outcome of a story. Distinguishing between the level of complexity of player interventions makes a crucial difference on the player's game experience, arguably having more influence than the future type per se.

In this context, Roy Bendor (2018) describes the uniqueness of computer games as a form of today's media by stressing new possibilities through the interactive possibilities of games: "[...] new media both create[s] and cater[s] to user expectations of being able to manipulate the actual features of the media." (p.10). The interactivity within a game generates feedback mechanisms between players and the game and depending on their design either captivate or weary the player (Bendor, 2018). The stronger the game can immerse the player into the game world, by creating engaging feedback mechanisms and high levels of interactivity, the more intense will the player's experience turn out (Farca, 2018). Farca (2018) points out, that the typology of critical dystopia type 2 offers the greatest potential for players to play-test different game outcomes. Giving the player the ability to choose between being the catalyst of the story opens up the greatest arena to experiment with future scenarios in context of individual choices and therefore reaches a level of interactivity that is unique for this specific typology, as the player (subconsciously) confronts their inner beliefs and values they might hold by interacting in the game world (Farca, 2018). However, the analysis concluded that only 12,8% of the games classified as type 2 critical dystopia. Such a result indicates that current commercial games are not fully exploiting their immersive potential and possibilities to let players experiment with different future types.

Additionally, Farca, (2018) emphasized the intrinsic educational value that lies within futures of critical dystopia type 2. The option for pursuing negative outcomes holds, in his opinion, the greatest potential for transformative thoughts within the players, which might prove useful to familiarize players for a sustainability context. An example to this is the prospect of using games to impart knowledge of sustainable development onto players. As thinking in sustainable terms often requires a 'systems thinking' approach that is inherently complex, games may offer the learning environment necessary to communicate such complex structures and teach players to comprehend different matters (Dieleman & Huisingh, 2006). In turn Miller (2018) argues, that educating citizens through the use of media and games holds great potential to actively employ individuals with future imaginations and create incentives to engage them with desirable futures while lowering the threshold of involving not only scientist with the imagination of the future, but also the public.

It is therefore likely to assume that with a high level of interactivity a player might improve their set of future literacy skills, as the option of play-testing different future outcomes

grants experiences and learning processes of the player (Farca, 2018). It can thus be suggested, that commercial games could play a crucial role in developing level 2 (discovery) of the futures literacy skill, due to the games' ability of letting the player play-test and engage with different future scenarios. Hence, the critical dystopia type 2 typology (Farca, 2018) could therefore open up the most possibilities to sharpen the futures literacy skills of players, making them more proficient to anticipate desirable (sustainable) futures. Moreover, this knowledge could be used to directly increase futures literacy by using it as a learning opportunity in the application of serious games. Individuals could then specifically work on improving their literacy.

Some types of systems were overrepresented within the content of the games and this discussion continues with touching upon a few most prominent findings. The analysis of the agency of nature within a game concluded that 56 games (80% of the analyzed) displayed nature in a static form, neither interacting with the environment or the protagonist. Additionally, the results of the state of ecosystem, demonstrated that in a third of the analyzed games, the ecosystem remains unspecified, mostly due to lack of classifiable data. This indicates a mostly incidental role for nature within games, often holding no or little influence over the overall development of a game. With the field of game studies still being relatively under researched, the potential role and depiction of nature in itself has not yet been addressed. Kelly and Nardi (2014) acknowledge the possibilities of games to make the player familiar with complex systems, suggesting its importance for delivering sustainability content. However, with the role of nature and the environment remaining subsidiary to the game, the potential of intensifying the concept and importance of nature within games remains low.

With almost half of the futures using technology as support and in a few games as the solution to prevent upcoming catastrophes humanity is facing, the role of technology in the analyzed games appears crucially important and overrepresented. This prevalence of techno-optimistic futures, as it is predominant in western social narratives, indicates the general trust humanity is putting into technology for solving the already present and upcoming issues humanity is facing (M. Huesemann & J. Huesemann, 2011). Interviewee SI2 expressed in this context the pitfall of using technology as the main pillar for future development, neglecting the importance of social behavioral change, as well as the need to realize the importance of individual behavioral change. Research indicates the crucial role of human behavioral change and the need to realize this on a collective, as well as individual scale, as "[i]t is clear that solutions to the predicament lie primarily in the domain

of human behavior.” (M. Huesemann & J. Huesemann, 2011 p. xix) With games being a distributor of the collective techno-optimistic idea, like any type of widespread media (M. Huesemann & J. Huesemann, 2011), this may indirectly inhibit the development of non-techno-optimistic ideas about futures. The current landscape of future social imaginaries is minted by techno-optimistic solutions to societal problems (Hajer & Versteeg, 2019). Therefore, leveraging narratives into games that steer away from techno-optimism might be fruitful for sparking new future social imaginaries in players.

### *Game sector opportunities*

The results of this study indicated a number of obstacles and opportunities for diversifying the game sector in terms of producers, audiences and more, ultimately leading to diversification of the futures delivered to the players.

Promising results were obtained from examining the distribution of future types after separating indie from mainstream games. As the results show, indie games represent a more diverse distribution of future types, even showing futures that would classify as the new sustainability paradigm. The findings of the interviews were consistent with that of Garda and Grabarczyk (2016), emphasizing the financial and creative freedom indie game developments have in comparison to mainstream productions as well as a more devoted community around indie games stimulated by communication between developers and players. The main differences of indie and mainstream games generate a diversity of content, often involving more passionate and individual aims for games (Garda and Grabarczyk, 2016).

In the light of the previous argument of a higher degree of financial independence, some interviewees stressed the importance for changes in the way games are funded to help diversify futures within games. A practical implication to counteract this dependence, could be government subsidies that specifically aim to support game ideas, which present (sustainable) futures outside the current landscape. Also learning from the workings of the indie game sectors, the interviewees recommended to further enhance the communication between developers and players, especially in the mainstream sector.

A number of interviewees stressed the importance to diversify the target audience in order to reach more diversified futures. Including women and age groups into the main target audience would result in a variety of different games, possibly shifting away from the current landscape of futures. In fact, in the U.S. already 46% of all gamers and all age

groups are women when including all platforms and device types, with the numbers slightly increasing over the last years (Gough, 2019b). Despite these large proportion of gamers being women, most interviewees had the impression that (especially mainstream) game companies would mostly cater to young men, often holding interest in technical futures with science-fiction elements, while neglecting other types of gamers.

Diversifying the workforce of game producers was also perceived as a solution to diversifying content and therefore futures within games. Interviewees expressed a lack of women as designers and developers both in the indie as well as in mainstream game companies.

Another identified driver was the beneficial prospect of diversifying game mechanics in form of introducing more interactivity into a game. By this, the game itself could hold more versions of outcomes, implying different types of futures a player could experience. Farca (2018) considers the level of agency over the outcome of a game as an important motivator to actively and critically engage players with a displayed future type. The higher the level of interactivity as well as the possibility to pursue potentially negative outcomes, the more pluralistic a future within a game might be.

Through further technological advancements both for game mechanics as well as developing software, the threshold for non-specialists to enter the field of game development would become noticeably lower. Interviewees indicated that with easier tools to create games, more individuals from different fields would be able to create games, even though they are lacking a game developer's technical background. Further improvements of the developing software Unity were often mentioned in this context to be promising. By this, new types of content and futures could be created, that emerge through the expertise of different fields of specialty or interest.

A phenomenon that may function as a driver or barrier is the link between games and escapism, which, in this context, concerns players who use gaming to flee from the everyday world. Multiple interviewees suggested that escapism is preventing game content from becoming too political, as players do not want to be confronted with game worlds that reflect their reality too closely. However, to diversify futures within games, escapism can also be used to populate unfamiliar types of futures, as interviewee S12 indicated.

The main barrier that might hinder a change in the game sector is the widespread use of familiar 'stock' dystopias. These are limiting the range of new content, as creating new worlds with complex structures requires a lot of resources. The interviewed game developers DEVI1 and DEVI2 expressed the usual habit of reverting to existing types of dystopias when creating a new game, both for the popularity among the target audience, as well as the resources it saves, to develop coherent narratives and worlds. This also points towards a lack of imagination among game developers which could also be explained by the currently narrow target audience and relatively homogenous workforce. Schulzke (2014) clearly distinguishes utopias and dystopias shown in games from other types of media in the sense that games generate context and developments of how futures were or will be reached. However, both players and game developers expressed a lack of transitional futures within games in the interviews, that are beyond the dichotomy of dystopias and utopias, explaining how a future in a game was specifically reached. One developer explained, that closely defining what actions led to a future in questions, requires complex and logically defined developments, that often can't compete with the setting of a familiar, pre-defined dystopia. Johnson and Tulloch (2017) confirmed this phenomenon as the theme of a dystopian world offers stock settings for game creators: "In the traditions of dystopia, emergency, danger and adversity are fundamental experiences: ontological crisis and a protagonist's eternal fight for survival are rendered normal and appropriate." (p. 245) Hence, static definitions and expectations of dystopian or utopian futures still seem to be prevailing in the game sector.

### 6.3 Further research and recommendations

There is abundant room for further progress in approaching measuring tools for better determining how future social imaginaries are currently and could hypothetically be influencing individuals as well as societies. The results from the interviews indicated that the current composition of futures within games will likely impact the players ability to imagine desirable futures. However, due to the far-reaching nature of the concept of future social imaginaries and the multitude of factors that play an influencing role on the different social imaginaries that exist within a society makes determining an exact effect or impact from games difficult in general, and specifically within the scope of this thesis (Jasanoff & Kim, 2011). Further techniques for determining limiting or influencing factors will therefore be beneficial for future studies.

Moreover, additional research should be undertaken to investigate the applicability and viability of the concept of futures literacy onto the commercial games sector. While this

research identified a possible connection between the two, qualitative and quantitative research could be conducted to investigate the potential role commercial games could have in sharpening the skills of futures literacy. In general, the academic field of game studies might hold promising insights when further incorporating it into the scientific discourse about societal norms, values and structures.

The game sector itself requires extensive research, as it is part of a massive entertainment industry, which is increasingly becoming more popular. For example, assessing the curricular and content of students in the game developing or designing area might be a starting point for understanding the current structures seen in the game sector. Moreover, to develop a full picture of the drivers and barriers for diversifying the game sector, additional studies will be needed that conduct (wide scale) market research, assessing consumer demands and current demographics of gamers in the context of different future types.

With the creation of the future possibilities framework, a tool has been developed that was proven successful in this research. To improve and expand the findings of this research, the framework could be applied to a much greater number of games. The framework could also be applied to specific types of games, for example only applying it to indie games to further assess the role of nature within this part of the sector.

There are still many unanswered questions about futures that could be depicted in games. As pointed out earlier, dichotomic types of futures are currently monopolizing the game sector with more pluralistic types of futures being eminently underrepresented. This plurality of futures would imply a shifting away from familiar dystopic settings and introduce different themes at once into a game, for example by not exclusively painting an either optimistic or pessimistic picture, but by allowing a composition of both. With the game sector currently perpetuating itself in terms of future types and the themes they display (Kelly & Nardi, 2014), inspirations for different futures types must be drawn from outside the field. Ideas could stem for example from the broader media itself, considering futures from the field of science fiction, as science fiction may spark innovative ideas and creating newly imagined content (Lee, 2019). Moreover, political theories or philosophical ideas could be incorporated, that picture alternative societies and futures for humankind. Social media could be used as a source for new future imaginaries, as the connection of individuals with similar interests may spark the creation of new imaginaries. Another



example might be coming from the commercial sector, taking social start-ups or sustainable businesses as a narrative for future imaginaries.

Looking at the results of this study in terms of the creative differences between mainstream games and indie games, further supporting game developments that are coined by giving the developer(s) a high degree of creative independence might help boost the diversification of futures within games. An example for an environment that enhances creative freedom are game jams which are “contemporary events that encourage the rapid, collaborative creation of game design prototypes.” (Locke, Parker, Galloway, & Sloan, 2015 p.1) These game jams foster the creation of games that are different from already existing games, characterized by inventive and alternative ideas. In the light of extending future types within games and increasing the capacity to let players acquire and improve futures literacy skills, game jams could specifically focus on this agenda.

An example for this, is the international sustainability game jam, hosted by the HKU University of the Arts Utrecht and the Faculty of Geosciences of the Utrecht University. In this context, groups of students were tasked with developing games that depict different kinds of futures that are absent in the current game sector. With this being the only guidelines, the students were encouraged to use their creativity in developing game prototypes. The results of this sustainable game jam showed a variety of different types of futures created, with unique ideas that differed from the distribution of future types of the for this research analyzed games (itch.io, 2019).

As Garda and Grabarczyk (2016) pointed out, one important factor that is relevant for the indie game sectors level of creativity, is their distinct way of funding in comparison to the mainstream game sector. To further enhance creativity of game productions, financial independence, and thereby less pressure from market demands, could be generated by establishing government subsidies or funds specifically aimed at diversifying the narratives of futures within the commercial game sector. In the case of the Netherlands, where funding is allocated for supporting the creative sector, to improve infrastructure for the development of businesses and the scientific community (Craft Council, n.d.), a part of this resource could be targeted at diversifying future types within games. With future research solidifying the impact of modern media on their consumers, and the need to widen future social imaginaries, this could boost the capacity of the game sector to diversify its content.

## 7. Conclusion

This research has been the first attempt to thoroughly examine the current field of commercial games for their depiction of futures in a sustainability context. This study was conducted based on the assumption that most games hold dystopic images of the future, and that such futures might impact the future social imaginaries of the players. While the second point was considered to be outside of the scope of the thesis and therefore assumed, the first premise was confirmed, with the results of the futures possibility space indicating a predominance of bleak dystopic worlds, and a general lack of positive or pluralistic futures. While these results raise important questions about the role of commercial games in shaping or limiting future social imaginaries, further research is needed to establish techniques to obtain more precise results regarding the influencing factors. However, one of the more significant findings emerging from this study indicates, that despite a widely dystopic landscape of futures in games, the level of complexity of the player's interactions is more relevant to active player engagement and development of the futures literacy skillset of the players. Commercial games that are characterized by a high level of interactivity and the option for the player to be the catalyst of the game's narrative enables individuals to train the futures literacy skill, a mental muscle that can be developed and improved by confrontation and repeated points of contact, empowering individuals to critically reflect on images about the future. An implication of this study is therefore that games do not only have the possibility of extending future social imaginaries by the types of futures they offer; but also by focusing on directly developing futures literacy. To reach this potential, this study concludes with giving recommendation for the game sector to diversify futures in games by pointing towards a diversification of the target audience and workforce as well as stimulating changes in funding to spark more creative independence. Taken together, these findings indicate a potential for commercial games to become a significant contribution for creating sustainable pathways to the future.

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## Appendix I Game sources

Figure 4: Game sources

Game	Studio (Year)	Sources
A New Beginning	Daedelic entertainment (2010)	<a href="https://www.daedalic.com/">https://www.daedalic.com/</a>
A Story About my Uncle	Coffee Stain Publishing (2014)	<a href="https://www.coffeestainstudios.com/">https://www.coffeestainstudios.com/</a>
Alien Isolation	Creative Assembly (2014)	<a href="https://www.creative-assembly.com/">https://www.creative-assembly.com/</a>
Alien Swarm	Valve Cooperation (2010)	<a href="https://www.valvesoftware.com/">https://www.valvesoftware.com/</a>
Beholder	Warm Lamp Games (2016)	<a href="https://beholder.gamepedia.com/">https://beholder.gamepedia.com/</a>
Beyond Good & Evil	Ubisoft (2003)	<a href="https://www.ubisoft.com/">https://www.ubisoft.com/</a>
Bioshock	2K Boston	<a href="http://www.bioshockgame.com/">http://www.bioshockgame.com/</a>
Black Mesa	Crowbar Collective (2012)	<a href="https://www.crowbarcollective.com/">https://www.crowbarcollective.com/</a>
Blade Runner	Westwood Studios (1997)*	<a href="https://en.wikipedia.org/wiki/Blade_Runner_(1997_video_game)">https://en.wikipedia.org/wiki/Blade_Runner_(1997_video_game)</a> *closed in 2003
Borderlands	2K games (2007)	<a href="https://borderlands.com/">https://borderlands.com/</a>
Chrono Trigger	Nintendo (1995)	<a href="https://chronotrigger.square-enix-games.com/">https://chronotrigger.square-enix-games.com/</a>
Cities: Skylines (green expansions)	Paradox Interactive (2017)	<a href="https://www.paradoxplaza.com/">https://www.paradoxplaza.com/</a>
Crackdown	Realtime Worlds (2007)	<a href="https://www.crunchbase.com/">https://www.crunchbase.com/</a>
Dead Space	Electronic Arts (2008)	<a href="https://www.ea.com/">https://www.ea.com/</a>
Deponia	Daedelic entertainment (2012)	<a href="https://www.daedalic.com/">https://www.daedalic.com/</a>
Deus-ex series: Human Revolution	Square Enix (2011)	<a href="https://www.square-enix.com/">https://www.square-enix.com/</a>
Doom (2016)	Id Software (2016)	<a href="https://www.idsoftware.com">https://www.idsoftware.com</a>
Enslaved: Odyssey to the West	Ninja Theory (2010)	<a href="https://ninjattheory.com/">https://ninjattheory.com/</a>
Eve Online	CCP Games (2003)	<a href="https://www.ccpgames.com/">https://www.ccpgames.com/</a>
Factorio	Wube Software LTD (2012)	<a href="https://factorio.com/">https://factorio.com/</a>

Fallout: New Vegas	Obsidian Entertainment (2010)	<a href="https://www.obsidian.net/">https://www.obsidian.net/</a>
Flower	Thatgamecompany (2009)	<a href="http://thatgamecompany.com/">http://thatgamecompany.com/</a>
Freedom Wars	SIE Japan studio (2014)	<a href="https://www.playstation.com/">https://www.playstation.com/</a>
Frostpunk	11 bit studios (2018)	<a href="http://www.11bitstudios.com/">http://www.11bitstudios.com/</a>
FTL: Faster Than Light	Subset Games (2012)	<a href="https://subsetgames.com/">https://subsetgames.com/</a>
Half-Life	Valve Cooperation (1998)	<a href="https://www.valvesoftware.com/">https://www.valvesoftware.com/</a>
Half-Life 2	Valve Cooperation (2004)	<a href="https://www.valvesoftware.com/">https://www.valvesoftware.com/</a>
Helldivers	Arrowhead Game Studio (2015)	<a href="http://arrowheadgamestudios.com/">http://arrowheadgamestudios.com/</a>
Homefront	Kaos Studios (2011)*	<a href="https://en.wikipedia.org/wiki/Homefront_(video_game)">https://en.wikipedia.org/wiki/Homefront_(video_game)</a> *Closed in 2011
Horizon Zero Dawn	Guerilla Games (2017)	<a href="https://www.guerrilla-games.com/">https://www.guerrilla-games.com/</a>
Immortal Unchained	Game Odyssey Ltd (2018)	<a href="https://www.immortalthegame.com/">https://www.immortalthegame.com/</a>
Impossible Creatures	Relic Entertainment (2003)	<a href="https://www.relic.com/">https://www.relic.com/</a>
Inside	Playdead (2016)	<a href="https://playdead.com/">https://playdead.com/</a>
Invisible, Inc.	Klei entertainment (2015)	<a href="https://www.klei.com/">https://www.klei.com/</a>
Mass Effect	Bioware (2007)	<a href="http://www.bioware.com/">http://www.bioware.com/</a>
Mega Man Zero	Capcom (2002)	<a href="http://megaman.capcom.com/">http://megaman.capcom.com/</a>
Metro 2033	4A Games (2010)	<a href="http://www.4a-games.com/">http://www.4a-games.com/</a>
Mirror's Edge	Electronic Arts (2008)	<a href="https://www.ea.com/">https://www.ea.com/</a>
Orwell: Keeping an Eye on You	Osmotic Studios (2016)	<a href="https://www.osmoticstudios.com/">https://www.osmoticstudios.com/</a>
Oxygen not included	Klei entertainment (2019)	<a href="https://www.klei.com/games">https://www.klei.com/games</a>
Papers, please	3909 (2014)	<a href="https://papersplea.se/">https://papersplea.se/</a>
Phantom Dust	Microsoft Game Studios (2004)	<a href="https://www.xbox.com/">https://www.xbox.com/</a>
Portal	Valve Cooperation (2007)	<a href="https://www.valvesoftware.com/">https://www.valvesoftware.com/</a>
Portal 2	Valve Cooperation (2011)	<a href="https://www.valvesoftware.com/">https://www.valvesoftware.com/</a>
Prey	Arkane Studios (2017)	<a href="https://www.arkane-studios.com/">https://www.arkane-studios.com/</a>

Rim World	Ludeon Studios (2018)	<a href="https://rimworldgame.com/">https://rimworldgame.com/</a>
Sanctum 2	Coffee Stain Studios (2013)	<a href="https://www.coffeestainstudios.com/">https://www.coffeestainstudios.com/</a>
Sim City	Maxis (1989)	<a href="https://en.wikipedia.org/wiki/SimCity">https://en.wikipedia.org/wiki/SimCity</a>
Soma	Frictional Games (2015)	<a href="https://www.frictionalgames.com/">https://www.frictionalgames.com/</a>
Spore	Maxis (2008)	<a href="https://www.ea.com/">https://www.ea.com/</a>
S.T.A.L.K.E.R: Call of Pripyat	GSC Game World (2009)	<a href="https://www.gsc-game.com/">https://www.gsc-game.com/</a>
Stanley Parable	Galactic Café (2013)	<a href="https://www.stanleyparable.com/">https://www.stanleyparable.com/</a>
Star Wars: Battlefront 2	Pandemic Studios (2005)*	<a href="https://en.wikipedia.org/wiki/Star_Wars_Battlefront_II_(2017_video_game)">https://en.wikipedia.org/wiki/Star_Wars_Battlefront_II_(2017_video_game)</a>  *Closed in 2009
Starbound	Chucklefish (2016)	<a href="https://chucklefish.org/">https://chucklefish.org/</a>
Stardew Valley	Chucklefish (2016)	<a href="https://www.stardewvalley.net/">https://www.stardewvalley.net/</a>
Stellaris	Paradox Interactive (2016)	<a href="https://www.paradoxplaza.com/">https://www.paradoxplaza.com/</a>
Subnautica	Unknown world entertainment (2018)	<a href="https://unknownworlds.com/">https://unknownworlds.com/</a>
Surviving Mars	Haemimont Games (2018)	<a href="https://www.haemimontgames.com/">https://www.haemimontgames.com/</a>
Sven Co-op	Sven Co-op Team (1999)	<a href="https://en.wikipedia.org/wiki/Sven_Co-op">https://en.wikipedia.org/wiki/Sven_Co-op</a>
Tales from the Borderlands	Telltale Games (2014)	<a href="https://telltale.com/">https://telltale.com/</a>
Tom Clancy's: The Division	Ubisoft (2016)	<a href="https://tomclancy-thedivision.ubisoft.com/">https://tomclancy-thedivision.ubisoft.com/</a>
The Surge	Deck 13 Interactive (2017)	<a href="https://www.deck13.com/">https://www.deck13.com/</a>
The Talos Principle	Croteam (2014)	<a href="http://www.croteam.com/">http://www.croteam.com/</a>
This War of Mine	11 bit studios (2014)	<a href="http://www.11bitstudios.com/">http://www.11bitstudios.com/</a>
Transistor	Supergiant Games (2014)	<a href="https://www.supergiantgames.com/">https://www.supergiantgames.com/</a>
VA-11 Hall A: Cyberpunk Bartender Edition	Sukeban Games (2016)	<a href="https://sukeban.moe/">https://sukeban.moe/</a>
Warframe	Digital Extremes (2013)	<a href="https://www.digitalextremes.com/">https://www.digitalextremes.com/</a>
Warhammer 40000: Space Marine	Relic Entertainment (2011)	<a href="https://www.relic.com/">https://www.relic.com/</a>

Wolfenstein the New Order	MachineGames (2014)	<a href="https://www.machinegames.com/">https://www.machinegames.com/</a>
Xcom: Enemy Unknown	Firaxis Games (2012)	<a href="https://firaxis.com/">https://firaxis.com/</a>

## Appendix II Future possibility space

Table 8: Dataset games indicators part 1

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>A New Beginning</b>	Markets first	Critical dystopia type 1	Reckless exploitation and human conflict extrapolated to total breakdown of humanity and ecosystems	Humans have exploited the planet and started a catastrophic shift when a nuclear bomb was detonated in the amazon rain forest. Nuclear winter degraded the whole planet	Indie	Adventure	Altering in today's behavior can save future destruction	2D, different places / buildings
<b>A Story About my Uncle</b>	Markets first	Critical utopia type 1	Interacting with foreign species, changes in traveling	Investigating the disappearance of his uncle, the protagonist finds himself in a foreign world	Indie	Adventure	Exploring the world, gliding through the world	3D first person
<b>Alien Isolation</b>	Breakdown	Anti-utopia	Space travel, hostile aliens killing humans, limited technology to defeat aliens	Space travel is developed for commercial and economic use, upon traveling to the different planets' humans come in contact with hostile aliens	Mainstream	Action-adventure	Stealth and surviving, circumventing aliens	3D first person
<b>Alien Swarm</b>	Breakdown	Anti-utopia	Space travel, alien invasion, use of nuclear bombs	Alien infestation leads to mission on planet in question, where the players have to kill all aliens	Mainstream	Action	Combat, detonating nuclear bomb	3D top down
<b>Beholder</b>	Fortress world	Classic dystopia	Mass surveillance, no personal freedom, oppressive state	Totalitarian state was introduced, total surveillance, no privacy	Indie	Adventure	Spying on tenants, creating profiles for the governments, reporting, blackmailing	2D isometric
<b>Beyond Good &amp; Evil</b>	Breakdown	Critical dystopia type 1	Conspiracy, government not protecting citizens	Unknown	Mainstream	Action-adventure	Delivering the truth about a government conspiracy enables the public to act up and rebel	3D third person



Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Bioshock</b>	Fortress world	Critical dystopia type 2	Underwater cities, genetic manipulation of living humans, unforeseen mental impacts of technologies	A wealthy man wanted to create the perfect society and build an underwater city for the elite. The wanted utopia turned into a dystopia after the introduction of genetic engineering and body enhancements went wrong	Mainstream	Action	Combat, solving puzzles, making moral decisions	3D first person
<b>Black Mesa</b>	Breakdown	Critical dystopia type 1	Secret research facilities, overstepping safety boundaries in research, alien invasion, hostile creatures, military interventions	Researching on alien materials attracts an alien invasion	Mainstream	Action	Finding ammunition, combat	3D first person
<b>Blade Runner</b>	Breakdown	Critical dystopia type 2	Advanced technology that allows humanoid replicas	Deteriorating condition of earth caused the creation of human replicas to discover habitable planets in space. Some replicas turned against humans and are now being hunted down by 'blade runners'.	Mainstream	Adventure	Finding clues, detective work to identify replicas. When a replica is identified, the player can choose between killing, arresting or letting them go which influences the further game	3D third person
<b>Borderlands</b>	Breakdown	Critical dystopia type 1	Colonization of space, free market, exploitation of resources, competitive corporations, war	Humans colonized other planets as corporations started exploiting planets for their resources.	Mainstream	Action role playing	Battling	Open world, 3D third person comic style
<b>Chrono Trigger</b>	Breakdown	Critical dystopia type 2	Hunger, total destruction, totalitarian regime	An alien is infested within the planet and uses DNA to feed. He destroys most of the world which leads to a future in which human are poor and	Mainstream	Action role playing	Fighting enemies and traveling through time	2D fictional world

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
				starving and need to fight against robots				
<b>Cities: Skylines (green expansions)</b>	Breakdown	Critical utopia type 2	Implementing sustainable measures into metropolises, making them sustainable	Implementing sustainable measures into cities	Mainstream	Simulation	Implementing sustainable development principles into metropolises	3D top down
<b>Crackdown</b>	Breakdown	Critical utopia type 1	Crime, totalitarian conspiracies	New World Order' is established by faking crime gangs in the city that increase acceptance of public for higher surveillance	Mainstream	Action-adventure	By fighting different gangs non-linearly and eliminating further crime, however this leads to a totalitarian state	3D third person, setting in an urban environment
<b>Dead Space</b>	Breakdown	Critical dystopia type 1	Space colonization, misusing religion, alien religion	Humans start colonizing space and build their own religion. After a relic is extracted from the colonies planet, a mass hysteria starts resulting in everyone killing each other and zombies emerging from their bodies that want to kill the remaining humans	Mainstream	Action-adventure (survival horror )	Combat and shooting, repairing the space ship	3D third person
<b>Deponia</b>	Markets first	Critical dystopia type 1	Space travel, having a planet to dump trash and not invent ways to recycle resources	The ascended humans forgot their origins over time and use the planet Deponia as a planet to dump their trash, having forgot that humans are still living there.	Indie	Adventure, Point-and-Click	Solving puzzles, stopping a conspiracy, conversation	2D isometric
<b>Deus-ex series: Human Revolution</b>	Breakdown	Critical dystopia type 2	Body enhancements (bio-hacking), social and political consequences of purely market based technological advancements	The conspiracy (multiple corporations and secret groups) tries to get body enhancements banned by abusing them leading to mass loss of life. The company the protagonist works for aims to make enhancements cheaper and available to all, creating a world where everyone can	Mainstream	Action role playing	social dystopia. leading role for technology and technology companies	3D third person, open world

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
				choose to surpass their human limitations				
<b>Doom (2016)</b>	Breakdown	Anti-utopia	Taking risks for research, consequences for finding new ways of energy sources, space colonization	Humans colonized Mars and are trying to find new energy sources	Mainstream	Action	Shooting and killing demons	3D first person
<b>Enslaved: Odyssey to the West</b>	Fortress world	Critical dystopia type 1	Oppression by robots, post-war breakdown of society	A world war destroyed most of humanity by introducing war robots that have the target to kill all hostile humans. After the war, the robots keep killing the humans, and they can only survive as slaves.	Mainstream	Action-adventure	Battling, solving puzzles to defeat villains	3D third person
<b>Eve Online</b>	Markets first	Anti-utopia	Colonizing space, war and trade	Humans discover a wormhole and use it to colonize space. The wormhole that human have used for supplying various planets in the galaxy breaks down. Most of the civilizations die and survivors build new colonies that battle each other for resources	Mainstream	Adventure role playing	Very complex game, different roles, jobs, resources, war and trade	Open world 3D third person
<b>Factorio</b>	Fortress world	Critical utopia type 2	Exploiting foreign planets for their resources, building massive constructions in space, destroying foreign ecosystems	Protagonist is stranded on foreign planet and starts building a huge factory in order to build a spaceship that would allow to get back to earth	Mainstream	Strategy	Resource gathering, production processes, combat foreign species	Isometric perspective (2D)
<b>Fallout Vegas</b>	Breakdown	Critical dystopia type 2	Atomic war, destruction of institutions, death of big parts of population	The US and China started a huge war prior the game which transforms the world into a wasteland with human survivors coming from various vaults	Mainstream	Action role playing	Combat, interacting with others	3D first person, open world

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Flower</b>	Breakdown	Critical dystopia type 1	Continuous degradation of ecosystems	Continuous degradation of ecosystems	Indie	Adventure	Exploring	3D third person
<b>Freedom Wars</b>	Policy reform or new sustainability paradigm	Classical dystopia	Overpopulation, resource scarcity, wars	The planet degraded so much that humans were forced to live underground. The world is so overpopulated, that being born itself is a crime that makes almost every human a prisoner. To regain basic rights, prisoners have to work for their panopticon with the goal to reduce their sentence.	Mainstream	Action role playing	Fulfilling duties for the state to regain freedom	3D third person
<b>Frostpunk</b>	Markets first	Critical utopia type 2	Catastrophic weather events, breakdown of society	Cold weather reshaped the planet, only allowing to survive if people adapt drastically to the cold temperatures. As a consequence, most of humanity dies	Indie	Strategy	Building a colony while adapting altered weather conditions of the earth, next glacial period	3D top down
<b>FTL: Faster Than Light</b>	Breakdown	Critical dystopia type 1	Space travel, governmental conflict, power of rebels	Space travel, intergalactic governments that are challenged by rebel groups	Mainstream	Strategy	Permanent death (if spaceship gets destroyed, the game resets), combat	2D top down
<b>Half-Life</b>	Breakdown	Critical dystopia type 1	Alien invasions, advanced technologies, portals to other dimensions, secret research facilities	After an experiment in a different dimension went wrong, a kind of portal is opened that starts a hostile alien invasion	Mainstream	Action	Mostly combat against aliens and humans, solving puzzles	3D first person
<b>Half-Life 2</b>	Breakdown	Critical dystopia type 1	Alien invasion, humans being held captive by hostile alien species	After a dimensional passage has been opened, aliens invaded planet Earth, enslaving all humans, stopping them from procreating to stop human evolution	Mainstream	Action	Mostly combat against aliens and humans, solving puzzles	3D first person
<b>Helldivers</b>	Markets first	Anti-utopia	New forms of democracy, space travel, world	Space travel allowed venturing into space, which eventually attracted hostile alien species.	Mainstream	Action	Combat, coordination with other players as	3D top down

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
			government, alien invasion	Democracy was replaced by guided democracy			the weapons can hurt them	
<b>Homefront</b>	Breakdown	Anti-utopia	War	Tensions between North Korea and rest of the world. Greater Korean Republic (GKR) emerges. After dwindling oil resources riots occur and the economic power declines, weakening the US, which is then overpowered	Mainstream	Action	Guerrilla fighting, military occupation	3D first person
<b>Horizon Zero Dawn</b>	Breakdown	Critical dystopia type 1	Using technology to wipe out humanity, artificial intelligence gaining power	A project was put in place with self-replicating, biomass consuming robots, and got out of control, taking over the planet and stripping away the planet's biosphere, destroying all life. After all life has been destroyed, robots were sent out to restore life and seedlings, human clones were sent out to repopulate the planet and if human existence gets out of control again, to kill them again	Mainstream	Action role playing	Technology is used to wipe all life from planet but also to reestablish nature and allow a 'reset' of life	3D third person open world
<b>Immortal Unchained</b>	Breakdown	Critical dystopia type 1	Myth, war	None	Mainstream	Action role playing	Through combat and area choice only.	Different 3D environments on different planets
<b>Impossible Creatures</b>	Markets first	Critical dystopia type 1	Genetic engineering, corporations gaining power	Genetic engineering was invented	Mainstream	Strategy	Creating creatures, finding power sources	3D third person
<b>Inside</b>	Not specified	Critical dystopia type 1	Mind control, environmental wastelands	Not explained in the game, however the invention of mind control most likely turned civilization into zombie-like behaviors	Indie	Adventure (puzzle)	Solving puzzles, running and hiding	21/2 D monochromatic

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Invisible, Inc.</b>	Unspecified	Critical dystopia type 1	Corporations overruling national states	Mega corporations have thrown over national governments	Indie	Strategy	Espionage on mega corporations to regain power	2 1/2 D Third person bird's eye perspective of different areas
<b>Mass Effect</b>	Fortress world	Critical dystopia type 2	Alien contact, space travel, great filter	Humans discovered the mass effect technology and joined in on intergalactic forces	Mainstream	Action role playing	Battling and decision making for narratives	3D third person
<b>Mega Man Zero</b>	Fortress world	Critical utopia type 1	War, oppressive political regime, genocides for survival of one species	Humans and repleids lived in peace and a utopia like state. An energy crisis started outbreaks, where humans started killing the repleids to save energy	Mainstream	Action-adventure	Through combat	2D third person
<b>Metro 2033</b>	Fortress world	Critical dystopia type 2	War, nuclear radiation	Nuclear war happened	Mainstream	Action-adventure (survival horror)	Through combat	3D first person
<b>Mirror's Edge</b>	Fortress world	Critical utopia type 1	Total surveillance, oppressive political regime	Control of media, communication and total surveillance	Mainstream	Action-adventure	Changing freedom against a comfortable lifestyle	3D first person, moving freely through a city environment
<b>Orwell: Keeping an Eye on You</b>	Breakdown	Classic dystopia	Mass surveillance, no personal freedom, oppressive state	An authoritarian state issued a law that allows spying on citizens for safety reasons.	Indie	Simulation	Finding clues in text messages, emails etc.	3D comic style, mostly looking at a screen
<b>Oxygen not included</b>	Unspecified	Critical utopia type 2	Unknown what happened to the rest of humanity	Unknown	Indie	Simulation	Species has left the earth to find a habitat elsewhere	2D of Asteroid
<b>Papers, please</b>	Markets first	Critical dystopia type 2	International relations, bureaucracy	None - except that in the game, terrorism and foreign conflicts worsen immigration law.	Indie	Simulation	Changing immigration laws that the player has to adhere with; different personal cases of people trying to get in.	Very limited - one location (border control)

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Phantom Dust</b>	Breakdown	Critical dystopia type 1	Uninhabitable planet, simulation of humans	A person comes close to a black hole on a space trip and 10000 years pass on earth, leaving nothing but dust and the whole humanity vanished. Not specified what exactly happened	Mainstream	Strategy	Through battling and regaining artifacts	3D third person
<b>Portal</b>	Breakdown	Critical dystopia type 1	AI's aiming to kill humans, mega corporations becoming more powerful, creating and using portals	Aperture Science is the rival of the Black Mesa research facility and they compete with each other with increasingly dangerous and morally questionable experiments	Mainstream	Action-adventure	New technologies change travel logic	3D first person
<b>Portal 2</b>	Fortress world	Critical dystopia type 1	AI's aiming to kill humans, mega corporations becoming more powerful, creating and using portals	The protagonist wakes up from long artificial deep sleep to discover, that Glados the AI is again putting her through test chambers	Mainstream	Action-adventure	New technologies change travel logic	3D first person
<b>Prey</b>	Unspecified	Critical dystopia type 1	Space travel, confrontations with aliens	More investing into space programs, aliens discover earth and attack it. Research/prison ship is launched into space	Mainstream	Action-adventure	Combat, researching	3D third person open world
<b>Rim World</b>	Markets first	Critical utopia type 2	Colonizing space, extracting resource to build a colony from foreign planet	Space colonization has happened to a certain degree, but colonization is slow and starts from scratch	Indie	Strategy	Resource gathering, colony building	2D top down
<b>Sanctum 2</b>	Markets first	Critical dystopia type 1	Colonizing a foreign planet, hostile native species, new energy sources (though still dependent on depletable resources)	Space colonization, mega corporations venturing out to space to gather resources	Indie	Action / strategy	Shooting enemies, building defense systems against local fauna	3D first person

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Sim City</b>	Markets first	Critical utopia type 2	Metropolises becoming more and more important	Depending on the city the player is building	Mainstream	Simulation	Metropolises, increasing importance of big cities	2D top down
<b>Soma</b>	Policy reform	Classic dystopia	Consciousness transfer, machines with consciousness, artificial intelligence	Technological advancements made it possible to directly control machines with the human mind. After meteorite shower on earth, an AI with the aim to save humanity uploads consciousness into industrial computers that are sometimes destroyed or very simple, putting the human minds in trouble	Indie	Action-adventure	No combat, player has to hide from enemies or lock them into rooms. Most of the gameplay consists of finding clues and exploring	3D first person
<b>Spore</b>	Fortress World	Critical utopia type 1	Evolution, space travel	Through panspermia (dust from outer space that brings life forms to a planet) a single cell reaches a planet and fully grows and develops into an intelligent species that ultimately begins to start space travel	Mainstream	Simulation	Developing a species, befriending or attacking other colonies / cities, space travel	Mostly 3D
<b>Stalker: Call of Pripjat</b>	Fortress World	Anti-utopia	Nuclear disaster, energy anomalies, mutations from radiation	After the Chernobyl incident in 1986, another incident happened in 2006, causing anomalies in the zone around the reactor. To investigate, science teams are set in that are killed by these anomalies	Mainstream	Action-adventure (survival horror)	Combat, investigating	3D ego shooter
<b>Stanley Parable</b>	Not specified	Classical dystopia	Being sheep for big corporations with no free will	Unknown	Indie	Adventure	By extrapolating today's role of corporations in a worker's life	Limited - one office building displayed in first person 3D
<b>Star Wars: Battlefront 2 (2005)</b>	Markets first	Critical utopia type 1	Galactic empire, space travel	Humans colonize space and build an intergalactic empire with a strong military force for protection	Mainstream	Action	Mostly combat	3D first and third person



Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Starbound</b>	Breakdown	Classic dystopia	Space travel, destruction of planet Earth, future technology such as teleportation	A god like creature created the universe and with it a powerful monster was created, that can only be defeated when all different race work together. The monster destroys planet Earth	Indie	Action-adventure	Powerful antagonists, collaboration with many different species	2D orthographic (no perspective), universe is procedurally generated
<b>Stardew Valley</b>	Fortress world	Critical utopia type 1	Individual choice, social relations, interaction with natural world	Main character quits office job, changes life course	Indie	Simulation and role playing game	The daily life cycle from waking up to sleeping dominates, induces player to plan ahead (harvest animal feed before winter, etc.)	2D top down
<b>Stellaris</b>	Markets first	Critical utopia type 2	Fighting against other species, genetically modifying other species for advantages, enslaving populations, forcing species to join own reigns	Space travel, contact with alien species, wars	Mainstream	Strategy	War, troops battling against each other, killing off species	3D top down
<b>Subnautica</b>	Breakdown	Critical utopia type 1	Colonizing space	Humans discover space travel and colonize other planets	Indie	Adventure	Explore and survive new surroundings	Open worlds, 3D first person
<b>Surviving Mars</b>	Markets first	Critical utopia type 2	Colonizing Mars, space travel, becoming self sufficient	Humanity is able to start colonizing Mars	Mainstream	Strategy	Colonizing Mars, building infrastructure on a new planet to sustain life	3D top down
<b>Sven Coop</b>	Policy reform	Anti-utopia	Secret research facilities, overstepping safety boundaries in research, alien invasion, hostile creatures, military interventions	Researching on alien materials attracts an alien invasion	Mainstream	Action	Combat and shooting, cooperation with other players	3D first person

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
<b>Tales from the Borderlands</b>	Fortress World	Critical dystopia type 1	Colonization of space, free market, exploitation of resources, competitive corporations, war	Humans colonized other planets as corporations started exploiting planets for their resources.	Mainstream	Adventure	Quick time events, choices in conversations	Some ego-shooter perspectives, cinematic perspectives
<b>Tom Clancy's: The Division</b>	Markets first (from appearance of big city)	Anti-utopia	Pandemic, collapse of economy and institutions, genome editing	Overpopulation, eco-terrorists misuse genome editing to create super-virus, aiming to killing 90% of population	Mainstream	Action role playing	Mostly combat	3D third person shooter
<b>The Surge</b>	New sustainability paradigm	Critical dystopia type 2	Technological advancements, deteriorations of social system and environmental degradation	Overpopulation, aging demographics, environmental diseases, technology replacing most jobs forced humans to flee to the suburbs	Mainstream	Action role playing	Battling, decisions making	3D third person
<b>The Talos Principle</b>	Markets first	Critical dystopia type 1	End of humanity, philosophical question about consciousness of AIs	Deadly virus killed all humans, knowledge has been uploaded to computers before which enables to create simulations and artificial intelligences	Indie	Adventure (puzzle)	Solving puzzles, choosing to cooperate or oppose	3D first person
<b>This War of Mine</b>	Breakdown	Classic dystopia	Total war state with chance of peace	Player is left unknown of what has happened to the world	Indie	Simulation	You play to attempt survival of civilians by controlling a group of people	2 1/2 D Third person close environment of a few places (house, supermarket, etc.)
<b>Transistor</b>	Breakdown	Critical utopia type 1	Artificial intelligence killing humans, consciousness uploads, futuristic cities	A few people were trying to improve the life in the city by producing AIs to fulfill the citizens wishes. The transistor was the key to control the AIs and was lost when they tried to take the consciousness of the protagonist to feed it into its	Indie	Action role playing	Programming the environment into every shape possible, AI attacking the protagonists, AIs killing humans	2 1/2 D

Game	Future type (Hunt et al. 2012)	Dystopian typologies (Farca, 2018)	Future themes	Threat type	Game type	Genre	Game mechanics	Perspective
				database. Following that event, they were no longer able to control the AIs and they started to go rampant over the city				
<b>VA-11 Hall A: Cyberpunk Bartender Edition</b>	Markets first	Classic dystopia	Androids, inflation, social injustice	Corporations gain power, social injustice increases, a strict king is put in place	Indie	Adventure (visual novel)	Listening to the guests, earning money to sustain yourself	2D
<b>Warframe</b>	Breakdown	Anti-utopia	Far future with humans mostly extinct and only descendants exists, war	Space travel and deep sleep enabled humans to wake up on a foreign planet with other hostile races. What exactly happened is left unclear	Mainstream	Action	Building weapons and armor, collecting, fighting, exploring, attacking, saving	3D third person
<b>Warhammer 40000: Space Marine</b>	Breakdown	Critical dystopia type 1 / Anti utopia	Space colonization, intergalactic empire, using planets for harvesting resources	Space colonization, different competing races	Mainstream	Action	Mostly combat	3D third person
<b>Wolfenstein the New Order</b>	Fortress world	Anti-utopia	War, oppressive political regime	The Nazis were empowered through esoteric technology and became unstoppable	Mainstream	Action-adventure	The future is mostly represented as an interactive movie in terms of the story - you mostly shoot people and have few choices to make.	first person 3D environment - closed off sections, but lots of detail.
<b>Xcom: Enemy Unknown</b>	Markets first	Critical dystopia type 1	Alien invasion	Aliens invaded the planet and try to get in control of the human race	Mainstream	Strategy	Combat and researching new technologies	3D third person shooter

Table 9: Dataset games indicator part 2

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
<b>A New Beginning</b>	Global	Two time travelers that survived	Saving the world by introducing a bio-fuel in a past reality	Not personified	Saving the world	The player can either fail or succeed in the task of saving the world	Vastly destroyed, extinction of most species, including humans	Purposeful (when mission is a success)
<b>A Story About my Uncle</b>	Local	Boy looking for his uncle	Finding his uncle	Not personified	Finding out clues about what happened to his uncle	Follow the story line	New world with unique flora and fauna	Responsive
<b>Alien Isolation</b>	Local	Adult daughter of Ripley	Seeking closure about what happened to her mother, stopping the aliens to reach other spaceships / ultimately earth	Aliens	Ripley can destroy the infested space ship	Follow the story line	Unspecified	Static
<b>Alien Swarm</b>	Global	Player as marines	Freeing the planet of aliens	Aliens	Eliminate aliens	None than following the objective	Ecosystems will be wiped out by nuclear bomb	Static
<b>Beholder</b>	Local	Carl, a state-installed landlord that is supposed to act in line with the government	Depends on player, either working for the government or helping the tenants	Not personified	Depends on player	Either act in line with the governments wishes or help the tenants, actions will influence the outcome of the game	Unspecified	Static
<b>Beyond Good &amp; Evil</b>	Cosmic	Resistance movement	Uncovering conspiracy about aliens, stopping abduction of humans	Aliens 'DomZ' and military troops 'Alpha sections'	A lot, by collecting evidence the public can be lifted from their ignorance	None beyond following the story line	Unspecified	Adaptive - anthropomorphic animals
<b>Bioshock</b>	Local	Jack, being stranded in Rapture he learns about the history of the city and	Finding out what happened to Rapture and escape	Hostile enhanced humans	The protagonist kills the main villain, the creator of rapture in the end of the game	Depending on actions towards the 'little sisters' in the game, there are three alternative endings	Underwater world, unspecified	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
		tries to escape						
<b>Black Mesa</b>	Local	Gordon Freeman	Surviving, containing the alien invasion	Not personified	Freeman can travel through the portal and destroy what keeps it open, stopping the hostile invasion	Follow the story line	Unspecified	Static
<b>Blade Runner</b>	Local	Investigator for identifying replicas from humans	Depending on player, either fighting the replicas, protecting them or putting them in custody	Not personified	Depending on what the player wants to pursue	Depending on player's behavior, the game can have 13 different endings	Mostly destroyed, most animals are extinct	Static
<b>Borderlands</b>	Local	Group of scavengers visit to planet; through the game they realize that they need to prevent a big corporation from finding the hidden alien artifacts	At first, finding the alien vault and then preventing the Atlas corporation to reach it first	Atlas corporation, bandits	Preventing the vault to be opened	Though it is an open world game, the story cannot be influenced by different actions	Mostly wastelands, aggressive animals that attack humans	Responsive
<b>Chrono Trigger</b>	Global	Group of people time traveling	Defeating the alien leader to save the planet from total destruction	Alien who claims sovereignty of the world	A lot - they can ultimately save the future	A lot by determining which ending is happening	Destroyed	Static
<b>Cities: Skylines (green expansions)</b>	Local	Major of the city	Building a sustainable city	Not personified	The player creates the city	Build a flourishing city	Intact	Adaptive (houses covered with vertical vegetation)
<b>Crackdown</b>	National	Soldier fighting against crime	Bringing peace to the city	Gangs, but real antagonist is the 'Agency' that tries to	Low - fighting gangs will bring peace but help establish totalitarian regime	None, then follow the main missions	Unspecified	Static / Purposeful (human can be biologically enhanced)

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
				implement totalitarian regime				
<b>Dead Space</b>	Local	Engineer working on spaceship	Escaping and surviving, later on stopping the infestation	Not personified	At first, getting the ship to run again, then bringing the religious relic back to the planet until the protagonist learns that he has been tricked to do so	Follow the story line	Unspecified	Static
<b>Deponia</b>	Local	Self-regarding character who wants to flee Deponia and get to the sky-city Elysium	Escaping Deponia to lead a better life in Elysium	Not personified	Uncover the conspiracy but is unable to stop the plan	Follow the story line	Destructed on Deponia	Static
<b>Deus-ex series: Human Revolution</b>	Local, but in a global context	Former security officer for a biomedical company.	Finding the truth/vengeance. At the end the protagonist chooses his own stance on the technological advances	Not personified	Stop tech advancements in body enhancements. Allow it within governmental restrictions. Completely stop further advancements. Destroy the facility the story end in, letting the world decide for itself (so the option to not choose).	Stop tech advancements in body enhancements. Allow it within governmental restrictions. Completely stop further advancements. Destroy the facility the story end in, letting the world decide for itself (so the option to not choose).	Purely contextual. The final scene is set in a large construction project in the Antarctic meant to reverse global warming.	Static
<b>Doom (2016)</b>	Local	Demon warrior fighting for humans	Defeating the attacks on Mars	Other daemons	Containing the demon attacks	Follow the story line	Mars surface (wastelands)	Static
<b>Enslaved: Odyssey to the West</b>	Local	Man experienced in combat and woman skilled	At first, merely surviving as another survivor forces him to help via a 'dead-	Advanced war robots, that still rule over the	Ending the world domination by robots	None except following the story line	Intact	Adaptive

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
		with technology	mans-switch', later in the game the protagonists want to destroy the robots	world as the war is over				
<b>Eve Online</b>	Cosmic	Player	Depends on player	Other players	Depends on player	Open end game, no clear objective of game therefore it depends on the player	Unspecified	Static
<b>Factorio</b>	Global	Stranded person on foreign planet	Building a flourishing factory to leave the planet, does not care about destroying habitat on planet	Alien species that develops to become a stronger opponent as the game carries on	Protagonist has no other choice that build a factory in order to escape	None other than building a factory	By further developing [development of] the factory, more pollution is generated that increasingly makes the indigenous species more hostile and aggressive	Responsive
<b>Fallout Vegas</b>	Local	Player can decide which group he wants to join	Depends on the player	Not personified	Depends on player, choosing a different group will lead to a different ending of the game	Depends on player, choosing a different group will lead to a different ending of the game	Fallout wastelands, but the game is also set in a desert area	Static
<b>Flower</b>	Local	Wind carrying a flower petal	Reaching all other flowers, transforming the somber city	Not personified	None	None	In the first levels healthy, the more towards the city, the more degraded	Purposeful
<b>Freedom Wars</b>	Local	Prisoner trying to reduce sentence to regain freedom	Regaining freedom	Protagonist - Prisoner trying to reduce sentence to regain freedom	Not much	None except following the story line	Destroyed	Static
<b>Frostpunk</b>	Local	Player as a manager of the colony	Ensuring survival of the colony	The cold weather	Follow orders from player	Player has to make morale choice that	Ice and snow	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
						influences the future of the colony		
<b>FTL: Faster Than Light</b>	Cosmic	Humans on spaceship	Surviving and delivering information to federation to save the government	Rebel groups	Either ensure continuity of government or its collapse	Ensure survival of ship to prevent destruction of the government	Unspecified	Static
<b>Half-Life</b>	Local	Male former researcher (theoretical physicist)	Stopping the alien invasion	Multidimensional empire, military	He believes to be able to stop the invasion, however he is not able to do so in the end	Follow the story line	Impacted but not destroyed	Static
<b>Half-Life 2</b>	Local	Male former researcher	Freeman wants to save humanity	Multidimensional empire, military	Protagonist and allies attempt to free humans from captivity but in the end, before this happens Freeman is placed in a deep-sleep	Follow the story line	Mostly destroyed	Static
<b>Helldivers</b>	Global	Helldivers, soldiers	Defeating the aliens	Aliens	Eliminate the attacks	Free choice of missions and quests	Ecosystem are impacted by tight population and construction on earth, but are not completely destroyed	Static
<b>Homefront</b>	Local	Former marine soldier joins resistance movement	Protecting his country and stopping the invasion of the GKR	Greater Korean Republic troops	Ultimately sacrificing himself to enable turning point in war	None except following the story line	Unspecified	Static
<b>Horizon Zero Dawn</b>	Local	Female from survivor's village, seeking truth about the killing robots	Well-intentioned character	Hostile robots	Uncover the secrets of the past, ultimately saving rest of humanity	Next to following the main story line, the player can do side quests	Intact	Static
<b>Immortal Unchained</b>	Cosmic scale	The protagonist appears to be	Aversion to existing power structures	Not personified	The main character breaks the entire cycle of fate	The player can choose to engage with the world and story in	Different planets - mostly degraded	Static



Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
		a hero from ancient times but turns out to be a god				different orders - and determine what the character looks like but cannot change the story.		
<b>Impossible Creatures</b>	Local		Defeating antagonist	An elite mercenary group hired by the conspirators	Defeating the antagonist	None than following the story line	Status quo <b>[?]</b>	Responsive
<b>Inside</b>	Local	Nameless boy	Mostly escaping dangers, freeing the creature held captive in the lab	Not personified	Not much other than freeing the creature or ending the mind control in the alternative ending	Freeing the creature or ending the mind control in the alternative ending	No sight of nature except in the end of the game, where it appears intact	Static
<b>Invisible, Inc.</b>	Global	Agents	Saving the agency from obliteration	Corporations	Ultimate goal of the game is to save the AI of the agency	None than trying to complete missions	Unspecified	Static
<b>Mass Effect</b>	Cosmic	'Shepard' joins the intergalactic government, ultimately has to make a major decision regarding the Reaper event	Depends on player, pro-human or pro-universe	Not personified	Protagonist is crucial for outcome of story	Lots of choice throughout the game, however ending options are somewhat similar	Differs per planet	Static
<b>Mega Man Zero</b>	National	Resistance group	Saving repleids, as they have the same rights to live than humans	Humans	Stop the killings and with help of ally to end the energy crisis and therefore bring peace	None beyond the story line	Intact at the beginning of the game, however the later antagonist's leader aims to destroy all nature except his city, to force <b>[forcing]</b> people to live under his tyranny	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
<b>Metro 2033</b>	National - Russia	Survivor living in the tunnels, tries to protect his home 'station' from others	Protecting his home 'station' from other survivors	Not personified	Trying to survive	Depending if the player helps other people throughout the game, there is an alternative ending that makes peace with a group of creatures that would be killed otherwise	Destroyed through atomic <b>[nuclear]</b> war	Static / adapted (mutated animals)
<b>Mirror's Edge</b>	National scale	Secret courier working against the government surveillance	Working against the totalitarian regime by delivering messages free of government control	Not personified	Not much, only trying to fight back by delivering messages	None beyond character's choices	Unspecified	Static
<b>Orwell: Keeping an Eye on You</b>	Local	Person who just started the job of an investigator has to give orders about the course of action regarding spied on individuals	Depends on player to work accordingly for the government or protect citizens	Not personified	Depends on player	Either follow the rules or help the citizens	Impacted but not destroyed (mostly buildings)	Static
<b>Oxygen not included</b>	Uninhabited asteroids	Workers in a small colony	Survival and subsistence of colony	Not personified	Medium	None beyond the main goal	Upon start of the game, the colony enters an untouched complex ecosystem of an asteroid	Static
<b>Papers, please</b>	National/international scale	Border guard	Depends on the player, but survival is important	Not personified	Very little - just able to determine immigration in a few cases.	None beyond the character's choices	Unspecified	Static
<b>Phantom Dust</b>	Local	Unnamed character that is an illusion	Uncovering the truth and saving the illusion of humanity	Friend of character, who created the illusions	Protagonist has the task to save and rebuild human kind	None except following the story line	Destroyed	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
				and is now battling against him				
<b>Portal</b>	Local	Test subject working through the test chambers	Absolving the tests, destroying the AI once its motives become apparent	AI named Glados ultimately wants to kill the player	Surviving and destroying the AI	None than following the story line	Unspecified	Static
<b>Portal 2</b>	Local	Female test subject	Fleeing the facility	Hostile AI	Surviving and destroying the AI	None than following the story line	Unspecified	Static
<b>Prey</b>	Local	Researcher on research / prison ship	Surviving, fighting aliens and finding resources to gain advantage	Not personified	Save the research or destroy the ship	Ending of game depends on choices player is making	Unspecified	Static
<b>Rim World</b>	Global	Three workers with different traits and abilities that the player can choose from	Surviving and building a colony	Not personified	Building a flourishing colony and ultimately leaving the planet	Building a functioning colony, ensure survival	Intact in the beginning	Static
<b>Sanctum 2</b>	Local	Protector of energy sources	Protecting the energy sources	Lumes (local fauna)	Trying to eliminate the hostile lumes creatures, they eventually discover a giant lume, which escapes and then destroys the mega city. The motives of the protagonist are left unclear, but he seems to be switching side, wanting to destroy the oligarchic regime at last	Follow the story line	Distinct planet with healthy ecosystem and hostile creatures living on it	Static
<b>Sim City</b>	Local	Major of the city	Building a flourishing city	Not personified	The player can create a 'green' city	Depending on player	Depending on energy source the player chooses, if it is	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
							renewable energy or a heavy polluting	
<b>Soma</b>	Local	Copy of consciousness of a person	Trying to find out what happened to himself and the world	Monsters	The protagonist aims to send the ARK into space that contains human consciousness as the last straw to save humanity	Throughout the game, various decisions have to be made regarding killing sentient robots that contain a human consciousness. But main story line is fixed.	Destroyed due to meteorite showers	Static
<b>Spore</b>	From a microscopic scale to continental, global and then cosmic	Species created by player	Developing to the next stage	Not personified	Player features an 'always win' where the species always reaches the end goal	Player can influence if the species acts social or aggressive but ultimately it will have the same outcome	The planet starts at the very beginning of life, with single cell organisms to a tribal stage with the environment intact to further development of the species until the planet is fully under control of the species [?]	Static
<b>S.T.A.L.K.E.R : Call of Pripyat</b>	Local	Scavenger hired by the government to investigate the crash of the helicopters	Finding artifacts to uncover why the helicopters crashed	Not personified	Depending on different actions, the game holds different outcomes	Depending on different actions, the game holds different outcomes	Strong radiation in the zone which caused humans and animals to mutate	Responsive (mutations)
<b>Stanley Parable</b>	National scale	Protagonist 'Stanley' is as office worker	Depends on player if they stick to the rules or choose for themselves	Voice over commenting on Stanley's actions	Not much, the character is trapped in the choices of the game	The player can choose between following the instructions or acting against it	Unspecified	Static
<b>Star Wars: Battlefront 2 (2005)</b>	Cosmic	Veteran storm trooper	Shooting invaders	Enemies	Defeat enemies	Follow the story line	Unspecified	Static
<b>Starbound</b>	Cosmic	Human that befriends	Defeating the monster	Enemies	Not much, as the main purpose of the	Free choice of missions and quests	Planet Earth is destroyed	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
		different alien species			spaceship was to work for Earth, the protagonist can now take on any mission he wants			
<b>Stardew Valley</b>	Local	Player (farmer/forager/miner), village residents	Player choice between community/mutual aid and capitalism	Community leader (if player leans corporate) or local corporate manager (if player leans community)	On a local scale, a lot (can make or break village community)	On a local scale, a lot (can make or break village community)	Slightly polluted but mostly intact	Adaptive
<b>Stellaris</b>	Cosmic	Depending on player to play for greater good or own advantage	Depending on player to play [aim] for greater good or own advantage	Enemies	Fighting other cosmic species with wars	Depending on player to play for greater good or own advantage	Unspecified	Static
<b>Subnautica</b>	Local	Player as only survivor on the water planet	Surviving and depending on player, investigating the secrets of the alien planet	Not personified	Depends on player, no linear story line	The player can choose to investigate what happened to destroyed spaceship and properties or concentrate on leaving the planet by building a new spaceship	Healthy and undisturbed underwater world	Static
<b>Surviving Mars</b>	Cosmic	Player	Depending on player what type of space colony to build	None except for harsh living conditions on Mars	Creating a flourishing colony	Depending on success of the player	Mars wastelands	Adaptive (bio-domes allow growing food, wind turbines for energy generation)
<b>Sven Coop</b>	Local	Players	Defeating aliens	Aliens	Not much, aliens respawn endlessly	Not much, aliens respawn endlessly. No real story line to follow	Unspecified	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
<b>Tales from the Borderlands</b>	Local	Female con-artist and employee of Hyperion, a gun producing company	Trying to escape being kidnapped [?]	Enemies	A lot, different actions that have different consequences (e.g. not killing or killing a villain)	A lot, different game development with different choices	Mostly wastelands	Static
<b>The Division</b>	Local	Division agent	Acting in his position as Division agent	Biologist / Eco-terrorist	Not much, virus is still distributed regardless of which side the player joins	The player can decide to either stay a division agent or join the side of the eco-terrorists	Unspecified	Static
<b>The Surge</b>	Local	After he gets a job and wakes up in ruins of the building, he tries to stop the launch of project Utopia	At first, he just cares for having a job, then he aims to stop a genocide	Enemies	Stopping the launch of the utopia rocket	The player can make decisions in the game regarding the launch of the Utopia rocket.	Collapsed	Static
<b>The Talos Principle</b>	Local	Android	Solving the puzzles	Not personified	Either stay in the simulation or escape	Depending on what the player chooses either staying in the simulation, become a patron for future androids in the simulation, or being transferred into a physical robot body leaving the simulation and exploring the uninhabited world	Unspecified	Static
<b>This War of Mine</b>	Unspecified	Civilians	Merely trying to survive	Rebels, military and sometimes other civilians	By surviving they eventually experience peace	Little, you can only try to let civilians survive	Human build <b>[built]</b> society in ruins, nature destroyed	Static
<b>Transistor</b>	Local	Red (female singer)	Finding out what had happened to the city and stopping the situation	Not personified	A lot - she can stop the robots and free the city. However, this leaves the city	None than follow the story line	Futuristic city with almost no nature	Static

Game	Scale	Protagonist type	Protagonist value	Antagonist	Agency over the outcome: by protagonist	Agency over outcome: by player	State of ecosystems	Agency of nature
					as a blank canvas and she has to rebuild it.			
<b>VA-11 Hall A: Cyberpunk Bartender Edition</b>	Local	Bartender	Building relationships with the guests to hear stories about the world	Not personified	None other than listen to the stories of guests in the bar	By mixing different drinks, guests will give different information	Unspecified	Static
<b>Warframe</b>	Global	Human descendants 'Tenno' Antagonist - hostile clones 'Grineer', hostile creatures 'the Infested' and 'Corpus' a mega-corporation	Bringing peace to the planet		Limited	Open world design allows player to do as they please, no real ending exists	Mostly intact foreign planet	Static
<b>Warhammer 40000: Space Marine</b>	Local	Space marine captain	Defeating the attackers on the mining planet	Orcs and 'forces of chaos'	At the end of the game, the planet is free from the attackers, however protagonist is being investigated for suspected collaboration with the attackers	Follow the story line	Set on a planet which main purpose is for military productions. Mostly wastelands	Static
<b>Wolfenstein the New Order</b>	European and inter-planetary	Resistance fighters.	Freedom and respect for human life	Nazis	They can only cause momentary victories.	Very little - can only choose which friends survive.	Degraded; but largely unspecified.	Static, though animals are weaponized
<b>Xcom: Enemy Unknown</b>	Global	Xcom commander fighting against the invasion	Stopping the invasion by combat and researching alien technology	Enemies	Ultimately the resistance fighters gain power over the aliens again and end the ruling	Narrative driven game	Unspecified	Static

Table 10: Dataset games indicators part 3

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>A New Beginning</b>	No	Humans are on the verge of extinction due to complete deterioration of ecosystems	Due to environmental degradation, life is only possible in caves or under the water	Anarchy	Unspecified	Time traveling as well as the knowledge about bio-fuels out of algae might save humanity and the environment	Pessimism / optimism	Optimism
<b>A Story About my Uncle</b>	Yes	Unclear, as protagonist enters an unknown world	Unspecified	Unspecified	Unspecified	Protagonists uncle developed inventions that allows to jump very high and glide through the air	Optimism	Optimism
<b>Alien Isolation</b>	Yes	Humans have colonized space and gather resources from foreign planets	Unspecified	Democracy	Growing, unlimited resources in space	Space travel, technology is displayed as lo-fi, having simplistic devices and appearances	Pessimism	Optimism
<b>Alien Swarm</b>	Yes	Humans on the alien infested planet that were meant to be saved by the protagonists are already dead	Unspecified	Unspecified	Mining colony on the planet in question has been destroyed	Weapons to kill the aliens, nuclear bomb, space travel	Pessimism	Optimism
<b>Beholder</b>	No	Humans live under an oppressive government with little personal freedom	Unspecified	Autocracy	Appears to be growing	Total surveillance, protagonist is injected with a drug that makes sleeping redundant	Pessimism	Optimism / pessimism
<b>Beyond Good &amp; Evil</b>	Galaxy-wide	Aliens are abducting citizens while the government tries to cover this up. Citizens start to rebel in light of the evidence made by protagonist Jade	Unspecified	Autocracy	Unspecified	Science-fiction technology, anthropomorphic animals	Pessimism	Pessimism



Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>Bioshock</b>	No	Most people living in Rapture suffer from mental illnesses caused from a substance that allows genetic engineering, attacking the protagonist and as a result being killed	Elites vs. middle class	Oligarchy	Rapture has been built by a wealthy man for the rich part of the civilization	Genetic manipulation, body enhancements, advanced weapons, armor	Pessimism	Optimism or pessimism (depends on players action)
<b>Black Mesa</b>	Yes	Humanity is threatened by the alien invasion, military intervenes	Alien invasion is major threat to humanity	Democracy	Unspecified	Black Mesa is a gigantic science laboratory with research on many different fields, including physics, bio-engineering, rocketry and so forth. Researching on alien technology opens a rift to another dimension, starting an alien invasion	Pessimism	Optimism
<b>Blade Runner</b>	Humans are looking for new planets to populate	There are humans and human like robots that are being hunted and destroyed when uncovered. However, the humanoids are not distinguishable from real humans. People live in overpopulated, dirty city with constant advertisement.	Unspecified	Democracy	Growth	Technology allowed for creating robots that look and act like humans	Pessimism	Optimism
<b>Borderlands</b>	Yes	Humans on the planet are left, trying to survive after a major corporation has left the planet, leaving them to scavenge for	Unspecified	Oligarchy	Mega corporations have a tight grip on multiple planets	The possibility of finding alien technology on the planet draws a lot of attention for major corporations, trying to	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
		food and fight against set free prisoners				get to it to have an advantage against competitors		
<b>Chrono Trigger</b>	Antagonist leader claims human life to extend his species to other planets	Humans in the future live in small groups and are struggling to survive against robots, mutants and destroyed food sources.	None	Autocracy	Barbarization	Technologically advanced society with robots. However, humans are still struggling not to starve	Pessimism	Optimism
<b>Cities: Skylines (green expansions)</b>	No	Humans are citizens in a metropolis, pursuing their normal lives	Unspecified	Unspecified	Growth	Electric cars, clean energy and other sustainable measures allow to create a sustainable city	Optimism	Optimism
<b>Crackdown</b>	No	Humans lead a relatively good life in a city, however there is a lot of crime until the end of the game where a totalitarian state is introduced.	Mostly peaceful	Autocracy	Market oriented	Important role, cybernetics and bio-engineering gives advantage to the secret regime that strives for power an advantage	Optimism	Pessimism
<b>Dead Space</b>	Yes	Humans have a colony on a distinct planet with their own (strong) religion. After a relic from that religion is being extracted from the planet, a mass hysteria breaks out and humans start killing each other, becoming zombie-like creatures (necromorphs) after their death, infected with an alien disease released from the marker [?]	An alien marker was found on earth and in order to test it, they made a copy and ran tests on it on a distinct planet to contain the necromorphs	Oligarchy	Strong companies exist (illegal mining operations)	Space colonization, genetic engineered virus, advanced mining weapons, stem cell research	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>Deponia</b>	Yes	A few humans are left alive on planet Deponia and live in poverty, most humans have left to live in the utopia-like sky city Elysium, leading a wealthy life. Humans on Deponia live within the trash with fresh water being their most valuable resource	Elysium treats Deponia as a dumping station and disregards human survivors on the planet	Oligarchy	People on Deponia live within the trash, people in Elysium live a wealthy life	Brain memory implants, spaceships, advanced technology in the utopia-like city Elysium, simpler technology on the planet Deponia	Pessimism	Pessimism
<b>Deus-ex series: Human Revolution</b>	No	Humans compete in all aspects of life with each other based on their investment in body enhancements, creating a social divide between the rich and the poor and a power struggle between employer and employees	governments lose ground to biomedical companies in terms of power, decision making and enforcement	Democracy	Large divide between rich and poor. Global economy is in the process of becoming dependent on enhanced humans for its functioning	technology (body enhancements) is the subject of every piece [part]of the game	Pessimism	Optimism
<b>Doom (2016)</b>	Yes	Humans on Mars are attacked by daemons [demons]	Earth is desperate for energy sources and pushes the research on Mars to find new ways	Unspecified	Energy crisis	Motivated to find an unlimited energy source for humanity, the catastrophe starts as a portal to 'hell' is opened and hostile creatures infest the planet, also space travel, cyborgs	Pessimism	Optimism
<b>Enslaved: Odyssey to the West</b>	No	Most humans are dead, the few remaining are held as slaves	Unspecified	Anarchy	Post-war, Barbarization	Advanced robots subjected all humanity	Pessimism	Optimism
<b>Eve Online</b>	Yes	Humans are stemming from four different races that	The races are trading with each other or fighting	Unspecified	Open-world economy depending on the way players	Creating portals to use wormholes, spaceships,	Optimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
		differ in their political constitution			play the game but resembles unregulated capitalism	sophisticated weapons		
<b>Factorio</b>	Yes	Only human is player, stranded on unknown planet	Player builds economy which makes alien species increasingly angry	Unspecified	Economy starts from scratch as the player proceeds to build a factory	As the player advances in building a factory, the technology advances, starting with basic factory technology to be able to build oil refineries and robots to help production processes	Optimism	Optimism
<b>Fallout Vegas</b>	No	Surviving humans have formed three different rebel groups in the area around the Mojave Desert, that are in conflict with each other	After conflicts between the US and China over resources, a nuclear 'great war' started destroying the planet	Anarchy	Broken down, subsistence	The Hoover Dam is generating energy and clean water for the surrounding area, making it a critical interest for different groups. A chip contains reprogramming software for robots working for Mr. House (leader of the authoritarian group)	Pessimism	Optimism
<b>Flower</b>	No	Humans are clustered in big cities, status quo like state	Unspecified	Unspecified	Market-oriented (judging from appearance of the city)	Unspecified	Optimism	Optimism
<b>Freedom Wars</b>	Yes, earth and a 'sky panopticon'	Almost all humans are imprisoned and live in huge prisons, fighting wars against each other	Each panopticon serves as an artificial nation that is at war with each other panopticon	Autocracy	Resource scarcity forces competition and wars	Struggling to research a way to live on the surface again	Pessimism	Pessimism
<b>Frostpunk</b>	No	Only a few humans are left, starting a new colonization and trying to survive	The colony is the only one left	Autocracy	Broken down	Technology is on the level of the late 19 <sup>th</sup> century to the late	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
						19th century, where the game is set		
<b>FTL: Faster Than Light</b>	Yes	Humans in this game are on a spaceship and trying to reach the ally ship, they can die and be replaced by clones	Space federation is due to collapse because of attacks from human rebel groups	Democracy	Unspecified	Faster than light travel allows traveling through space, advanced weapons, drones, clones	Pessimism	Optimism
<b>Half-Life</b>	Yes	Humans live appears similar to real life living <b>[?]</b> until the alien attack happens	Unspecified	Democracy	Advanced undercover science plays a significant role in this world, economy is expected to be growing	Huge science research facility is conducting questionable experiments, one of them causes a hostile alien invasion. Technologies include new resource mining technologies, body armor, weapons	Pessimism	Pessimism
<b>Half-Life 2</b>	Yes	Humans are oppressed and biologically altered; procreation is being prevented	Humans are ruled by aliens	Unspecified	Broken down	Mishap in research facility gave rise to hostile aliens, force fields to keep control of humans, teleportation, gravity guns	Pessimism	Pessimism
<b>Helldivers</b>	Yes	Humans on 'Super Earth' are following the managed <b>[?]</b> democratic government blindly	Super Earth is infested with three hostile alien creatures that need to be subdued, according to the government	Democracy	Similar to today	Space travel was discovered	Optimism	Optimism
<b>Homefront</b>	No	US citizens are either being forced to join the Korean forces or are killed, rest of the world unspecified	Towards world domination by a united Korea	Democracy	At war	Nuclear bombs created the shift in power	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>Horizon Zero Dawn</b>	No	Only pockets of humans survived big catastrophe, small rural villages with Stone Age like living conditions. Are being chased by robots	None, civilization is reduced to a few small tribes	Unspecified	Broken down	Robots lived in coexistence with humans when <i>[until]</i> a 'virus' reprogrammed them to attack the remaining humans	Optimism	Optimism
<b>Immortal Unchained</b>	Cosmic scale	Humans are one among many races of beings.	Apocalyptic war between different races	Oligarchy	Not specified	Technology is similar to magic in fantasy settings.	Pessimism	Optimism
<b>Impossible Creatures</b>	No	Similar to today	Unspecified	Unspecified	Head of a mega corporation wants to take over the world with the engineered army	Technology allows to genetically modify animals by combining two species together to build armies	Pessimism	Optimism
<b>Inside</b>	No	Humans are zombie-like creatures that can be controlled by helmets	Unspecified	Unspecified	Unspecified	Mind control, experiments with water bodies, creating a new creature	Pessimism	Pessimism
<b>Invisible, Inc.</b>	No	Human are oppressed in world ruled by mega-corporations	World domination by multinational corporations	Oligarchy	Multinational corporations in control of everything	Technology ultimately saves humanity by an AI destroying the antagonists	Pessimism	Optimism
<b>Mass Effect</b>	Yes	Humans have colonized space and live a relatively good life; imminent Reaper event will result in total extinction of humanity	Intergalactic UN-like government	Democracy	Unspecified	Ancient alien technology allows to travel through space in such a fast manner, that humans were able to discover the universe	Optimism	Optimism
<b>Mega Man Zero</b>	No	Due to an energy crisis, humans want to destruct humanoid robots to save energy	Post war setting	Oligarchy	The energy crisis is a catastrophic problem	Technology plays a crucial part (humanoid robots)	Pessimism	Optimism
<b>Metro 2033</b>	No	Living under the surface to avoid radiation from nuclear war, survival	Chaos, mostly unspecified	Anarchy	Probably Barbarization	Technology plays a minor role	Pessimism	Pessimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>Mirror's Edge</b>	No	Life is set in a 'utopian' city with almost no crime and a comfortable lifestyle	Unspecified	Autocracy	Similar to today	Technology is important, total surveillance through cameras and control of media	Pessimism	Pessimism
<b>Orwell: Keeping an Eye on You</b>	No	People live in an authoritarian state and have little personal freedom	Unspecified	Autocracy	Growing	Orwell, the surveillance system, allows to spy on persons of interest. Investigators (located outside of the state) search through all data and then send selected data to people on the inside, called advisors	Pessimism	Optimism-pessimism
<b>Oxygen not included</b>	Yes, multiple asteroids	Humans are clones and fulfill the role of workers in the colony	Unspecified	Autocracy	Unspecified	Starting with basic technology, the colony can develop elaborated technology, ensuring survival	Pessimism / optimism	Optimism
<b>Papers, please</b>	No	Humans are largely numbers in a bureaucratic system	Tense relations between countries	Autocracy	Resources divided by the states	Imperfect border control - bureaucratic systems - forged passports	Pessimism	Pessimism
<b>Phantom Dust</b>	No	Humans are just illusions as the whole humankind has vanished. They do not know they are constructed and deconstruct upon learning they are illusions.	Unspecified	Anarchy	Nonexistent	Technology allows to clone and construct illusions	Pessimism	Pessimism
<b>Portal</b>	No	Humans outside of corporation not further specified, inside the Aperture science center they are test subjects,	Unspecified	Oligarchy	Set in the Half-Life universe, mega corporations hold a lot of power and have	Portal gun, that can create portals to cross obstacles, AI performing tests on human subjects	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
		living on a very limited space			brought different catastrophes through that			
<b>Portal 2</b>	No	Humans outside of corporation not further specified, inside the Aperture science center they are test subjects, living on a very limited space	Unspecified	Oligarchy	Set in the Half-Life universe, mega corporations hold a lot of power and have brought different catastrophes through that	Portal gun, that can create portals to cross obstacles, AI performing tests on human subjects	Pessimism	Optimism
<b>Prey</b>	Yes	Aliens are trying to attack earth, relatively normal life	Set in alternative past, the US and the USSR join forces to fight the aliens	Democracy	One mega corporation is gaining control in the last phase of the game	Spaceships, later in the game neurotechnology developments, allow humans to gain greater power	Pessimism	Optimism
<b>Rim World</b>	Yes	Humans have colonized a part of space, but as faster than light travel has not been invented, the expansion of the universe is limited. Planets are mostly separated and differ strongly in their development, with some planets fairly evolved and some still set in middle ages colonies.	People on the rim-world live in a big colony	Autocracy	Economy starts from scratch; the players builds up an economy	Technology is far advanced but differs strongly on each planet. On the rim planet the protagonists are stranded on, technology can be advanced to ultimately build a spaceship (big tech-tree)	Optimism	Pessimism
<b>Sanctum 2</b>	Yes	Through the corporation Britech, a wealthy colony has been established on a foreign planet that relies on local power sources for supply. Humans live a	Mega city build by a corporation extracting power and resources from foreign planet. Tribe-like living humans form counter	Oligarchy	Growing with resources from foreign planet	Space colonization, futuristic energy sources, sophisticated weapons	Pessimism	Pessimism



Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
		sophisticated life in the city, but arboreal settlers are at risk by being attacked by local fauna	organization against them					
<b>Sim City</b>	No	Humans are to be managed in this city builder game, creating living spaces, neighborhoods, workspaces, parks	Depending how the player interacts with neighboring cities	Unspecified	Not further specified	Technology can help develop the city even further	Optimism	Optimism
<b>Soma</b>	No	Humans exist only as copies of their consciousness in mostly industrial machines due to a failed 'save humanity' program executed by an AI	None	Unspecified	None	Technology allows to upload human consciousness into robots. However, consciousness is copied (not transferred), meaning that the consciousness has to be killed to wipe it out	Pessimism	Optimism
<b>Spore</b>	Yes	No humans involved in the game	Tribal phase - other colonies which the player can befriend or attack Civilization stage - some allied cities, some cities are hostile	Unspecified	Depending on if the player chooses the economic path in the civilization stage, a growing economy can be used to get world domination	Through the development of the species, technology gains a bigger role (space travel when fully developed)	Optimism	Optimism
<b>Stalker: Call of Pripjat</b>	No	Mostly a few bandits and scavengers live in the zone around Chernobyl	Unspecified	Democracy	In the zone there is a limited trading system in place	Weapons	Pessimism	Optimism
<b>Stanley Parable</b>	No	Humans are trapped inside the corporate system with little options of action	Unspecified	Oligarchy	Mega corporations	Technology is mostly in control of humans	Pessimism	Pessimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
<b>Star Wars: Battlefront 2 (2005)</b>	Yes	Humans are scattered through the universe, living on different planets	Galactic republic is attacked by separatists, a new hostile empire is on the rise	Democracy	The economy of the galactic republic is strong and growing	Space travel, advanced weapons	Optimism	Optimism
<b>Starbound</b>	Yes	Planet earth and the humans on it have been destroyed	Different species in the universe that cooperate with the protagonist	Unspecified	None	Teleportation, spaceships	Pessimism	Optimism
<b>Stardew Valley</b>	No	Humans are part of social community with individual life stories and relationships, choices matter	Indirect reference to war fought in far-off country by NPC veteran	Democracy	Mega corporations, resistance on local scale (player can choose between community or corporate dominance)	Technology allows substitution of manual labor	Optimism	Optimism
<b>Stellaris</b>	Yes	Humans are one part of a big galaxy	Intergalactic democratic governments	Democracy	Every nation has their own economic processes	The game gains depth through constantly researching new technologies	Optimism	Optimism / pessimism
<b>Subnautica</b>	Yes	Humans have colonized space	Transnational Government	Democracy	Unspecified	Advanced spaceships allow the exploration of distant planets, technology plays major role in being able to survive in the under-water submerged world	Optimism	Optimism
<b>Surviving Mars</b>	Yes	Humans are colonizing Mars, need to be able to fulfill their needs as they will otherwise become homesick or suffer from depression	Geopolitics on earth as of today	Unspecified	Depending on which sponsor the player chooses (US, Russia, Europe, China, etc.) the abilities and	Technology to colonize Mars (e.g. rockets, space stations), drones, cyborgs	Optimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
					difficulties in the game change			
<b>Sven Coop</b>	Yes	In the Half-Life universe, humans are threatened by an alien invasion	Alien invasion is major threat to humanity	Democracy	Unspecified	Black Mesa, a gigantic underground research facility, is attacked by aliens after opening a portal to an alien dimension	Pessimism	Optimism
<b>Tales from the Borderlands</b>	Yes	Humans on the planet are left, trying to survive after a major corporation has left the planet, leaving them to scavenge for food and fight against set free prisoners	Unspecified	Oligarchy	Resources were extracted from Pandora for the earth by a few mega corporations, until it wasn't feasible enough. World is probably ruled by a few powerful corporations	Sentient robots are living on planet Pandora, cybernetic enhancements on humans (protagonist has cybernetic eye that allows him to scan objects)	Pessimism	Pessimism
<b>The Division</b>	No	Most humans in NY have died, few struggling survivors	Breakdown of institutions	Anarchy	Barbarization	Genome editing was used to purposely cause pandemic	Pessimism	Optimism
<b>The Surge</b>	No	Humans are struggling to survive on a toxic planet with a continuously degrading environment	Global governments collapsed	Anarchy	Barbarization	A mega corporation named CREO wants to prevent the end of the earth by shooting satellites into the atmosphere, releasing chemicals to stabilize the atmosphere and allow ecological life to restore itself. After failing[,] project Utopia is about to launch, using nanotechnology to prevent environmental death	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
						(however this is a secret mission to kill most of humanity)		
<b>The Talos Principle</b>	No	All humans have died due to a deadly virus, only human knowledge has been saved before which now starts simulations	Unspecified	Unspecified	Unspecified	A project, which should have created humanoid androids as the last remnant of humanity, was not completed in time. However, the player plays a conscious android in a simulation, guided by a voice over	Pessimism	Pessimism
<b>This War of Mine</b>	Earth and moon	Being civilian in a war setting, surviving	War between unknown countries	Anarchy	Barbarization	Minor importance, little technology is used when players have developed basic survival methods	Pessimism	Pessimism
<b>Transistor</b>	No	Living in a utopian city where citizens are allowed to vote regarding almost all matters, most humans have vanished, and the streets are deserted	Unspecified	Democracy	Flourishing city and economy right before the plot of the game starts	Changing the environment (city appearance, sky, etc.), artificial intelligence robots	Pessimism	Optimism
<b>VA-11 Hall A: Cyberpunk Bartender Edition</b>	No	Human living in dystopian world, obeying a harsh king with powerful mega corporations with and food shortages	Unspecified	Oligarchy	Mega corporations	All humans are induced with nanobots, sentient androids	Pessimism	Pessimism
<b>Warframe</b>	Yes	Human descendants wake up in a far future and have to battle against other races	Four parties on planet, human descendants, militant species of clones, traders and virus-ridden species that	Unspecified	Unspecified	Sleep chamber enabled to bring human descendants into far future, clones exists, sophisticated weapons	Pessimism	Optimism

Game	Planetary System	Human life	Geopolitical relations	Forms of government	State of economy	Role of technology	Essence	Influence
			transformed into monsters					
<b>Warhammer 40000: Space Marine</b>	Yes	Humans are united in the 'empire of man'	Empire is challenged by hostile orcs as well as the forces of chaos, the planet on which they are producing weapons is being attacked and they need to save the weapons as they are important	Democracy	Growing with cosmic resources	Space colonization, genetic enhancements, heavy weapons	Pessimism	Optimism
<b>Wolfenstein the New Order</b>	Earth and moon	Humans live in an oppressive regime; many human-machine hybrids.	World domination by the Nazis	Autocracy	Fascist-run economic system	Technology has empowered the Nazis to win WW2 and plays a big role in their regime.	Pessimism	Optimism
<b>Xcom: Enemy Unknown</b>	No	Humans are attacked by an alien species that are trying to gain control over the human population. Later in the game, the aliens are able to manipulate humans by using mind control	IGO that fights against aliens, member states involved (keep them happy to make the agreement)	Democracy	Halted	Technology of aliens is superior to human technology; therefore, they are under pressure to research new technologies to be able to attack the aliens efficiently	Pessimism	Optimism

## Appendix III Interview guide

Table 11: Interview guide

Questions	
1. Information to interviewee: education, former jobs, current job, personal interests in games	Information about interviewee
2. From your standpoint: how are futures (in sci-fi games or alternative futures) mostly represented in games? Are there any common themes or things that reoccur? 3. Do you think there is something missing in commercial games? If yes, what would that be? 4. Can you think of reasons, why some future types are overrepresented while others are almost absent in the game sector?	Representations of futures in games
5. What is necessary to provoke such change (education, public interest, technology, ...)? (Drivers) 6. What could hinder a change? (Barriers) 7. From your experiences in your job / your personal experiences: Have you ever encountered these 'limitations' of the game sector while e.g. developing a game, publishing, playing a game, looking for something specific?	Change in the game sector
8. How do you see the relationship between futures portrayed in games (specifically) as part of media (more generally) and what people imagine when they consider actual futures? 9. Intrinsic value of games opposed to other media	Media and games

10. Would you be interested in a shift of what currently exists? Can you think of themes outside the possibility space?	Possible futures in games
11. What type of future could be important to convey through games to foster sustainable thinking?	
12. Other insights	

## Appendix III Interviews

Table 12: Summarized results of interview guide

	Interviewee (abbreviation)
Question	<b>Interviewee RS1</b>
1.	Former SD ESG student, now doing a PhD. Created a serious game in context of Kyoto food development. Currently developing a game for first year students to bring them in touch with SDGs
2.	Mostly sci-fi futures, uninteresting for her. Specific target group (young white male with tech interest) is addressed but what about women / elder people
3.	Content that is for a different target group, games that work with 'game literacy' and create games for people that are not so keen with playing with controllers.
4.	The consumers or players don't want to engage with the future the games are displaying. Futures in games are rather disconnected to allow for distance to the player for them not to be confronted with political content
5.	Women / older people that are interested in games too, change from the indie game sector, which is gaining influence, potential audience for games is everyone, games need to 'connect points' to create games that more people like
6.	Right now, the gaming scene is marked by extremes, the stereotypical gamer that created a hype around it and then the really diverse gamers, who do not identify with any of it. There seems to be no middle ground for

	'normal' people who want to play games. 'Game literacy' is a big barrier. Gamergate --> off-putting toxic masculinity, intense group, stereotypes
7.	When developing serious games, the aim is to deliver the message to the player. The game starts with that as opposed to casual games, where the message itself is not the priority
8.	-
9.	Games are very interesting from a researcher's standpoint as they can immerse players into game worlds and educate them about otherwise unknown worlds
10.	More games, that are not for the specific target group of current gamers and can reach people that are not 'nerds' in that kind of sense. A game where the player plays a fox that explores its old city and the consequences of unregulated capitalism (what's the name of the game)
11.	-
12.	Solarpunk, eco-futures
13.	Sudden change but not gradual. Most games show a capitalistic system, even politics is something game designers and developers try to avoid, however space mining or other form of capitalistic actions are shown regardless
	<b>Interviewee RS2</b>
1.	Master thesis: world play for tipping points, bachelor's in psychology, risk perceptions, worked for PBL (municipality), PhD at urban future studios, serious games
2.	-
3.	-
4.	Conflict is necessary (how fairytales end, story has been told), media is always delivering 'crisis' and that humans need to take action to prevent further crisis, <b>media is putting constraints on imagination</b> . Exception to this are city builders, that show a different type of future than other games.



	Problem to imagine desirable futures, as this is not the societal narrative. "Easier to think of a bad future than a good one"
5.	Instead of evoking fear in the public, the narrative has to change to something different, more a back casting approach (imagining a desirable future, not only how to mitigate)
6.	From her research: media (fiction) can influence society. Limited types of futures in media influence the imagination of people.
7.	-
8.	Adaptive capabilities, goal setting, people don't want to take action or response to if fear is the motivator of message delivered by the media. Most people see the present and the future as something static rather than something that is changing and in itself something very unstable. Change is happening all the time. Therefore, offering limited types of futures in games generates limited possibilities to anticipate futures
9.	-
10.	-
11.	-
12.	Who is playing games? Demographics and more numbers would be interesting
	<b>Interviewee RS3</b>
1.	Researcher in field of video games, increasing empathy through games (indie game Bury me my love)
2.	-
3.	-
4.	It is easy to create conflict liberated from everyday world problems. Future driven narratives about dystopias haven't changed much since the 80s. But the future can be created by taking ideas that are already there and implementing them
5.	One person developers hold promising perspective, as they can create games for a longer time with less pressure from producers / markets. More

	female writers - diversifying workforce will help to diversify writing. Avoiding escapism and introduce mundanity (as in life is strange) opens up possibilities. Diversifying target group instead of aiming for the specific target group for shooter games e.g. Unity democratizes game development
6.	Publishers don't want their games to become too political in order to reach the biggest target audience, as their main focus is market-orientation and making business which sells best the 'grim dystopian way' --> catering to anyone. Indie studios are even more concerned with this as they are more fragile to what they can sell
7.	-
8.	-
9.	-
10.	-
11.	-
12.	When looking at the type of future a game holds it is also very important to look at the game mechanics that could depict the future, as games themselves stand out with their uniqueness
	<b>Interviewee RAG1</b>
1.	Anticipatory climate governance (re-imagine), policy planning, CCFAS
2.	-
3.	Positive future types, futures with policy reforms, eco-communalism and new sustainability paradigms
4.	Multiple reasons: landscape of game developers, economic pressure, consumer demand, homogenous producers of games, Mainstream company cater to young men
5.	Increase participatory approach of games, start with trying to implement more futures (but how?)

6.	Economic grip on development of games limits creativity. Maybe this is different for indie games? Interested to look into if there is a different distribution of future types within indie games
7.	-
8.	Players are being channeled into a representation of social imaginaries that depict undesirable futures, which is not a positive thing from an anticipatory governance perspective.
9.	Safe space to try out different scenarios of futures
10.	Explorative environmental potential for neglected futures types. Imagining futures grants a lot of (transformative) power that is hardly measurable but influencing society
11.	-
12.	Game sector needs to transform (as well as the people within it) to be able to make a shift into a different direction.
<b>Interviewee SE1</b>	
1.	Researcher working for CCAFS, working with scenarios, foresight processes, policy reviews, PhD how can foresight be improved, SES (socio-ecological systems)
2.	Games cater to young men, dystopias, sci-fi futures, stereotypical games
3.	Different types of futures, unused potential
4.	It all started with the dystopia hype in the late 70s with Orwell's 1984 and environmental awareness, environmentalist's perspective --> development of dystopian cultures
5.	Future is uncertain and it can be explored by trying different types of future in games -> plurality of futures in games

6.	-
7.	-
8.	Narrows down the imagination -> back casting
9.	-
10.	-
11.	-
12.	Maybe there are games that aim to explore different kinds of future? Might be interesting to compare those to the other games
	<b>Interviewee SI1</b>
1.	Professor, Munk School of Global Affairs & Public Policy, Presidential Advisor on the Environment, Climate Change and Sustainability Toronto
2.	-
3.	-
4.	Cultural passiveness, cultural reflection of current mood in society, 'millenarianism'. In the 60s there was greater cultural optimism than today, people are unable to imagine desirable futures
5.	Market is changing, market for games is getting bigger and is diversifying. Shift from cultural passiveness
6.	Games only hold up the mirror of what is going on in society at the moment
7.	-
8.	Gradual change is not possible, as everything changes all the time. Business-as-usual itself as a concept does not exist / work. Games could open the opportunity to engage with futures, for example when it is set in a far and distant future. Currently there are structural problems (more men as developers and so on)
9.	Game mechanics offer intrinsic value, affordances, some games could it do better than others

10.	More medieval games -
11.	-
12.	Incremental futures don't exist! Clarify in limitations, that fantasy futures are excluded from the research. Absence of reasoning -> information gap and we want to fill it (answers if we want to fill it)
	<b>Interviewee SI2</b>
1.	Originally came from the field of international development until he realized, that only helping countries develop will not solve the problem. Sustainable development is necessary. Researching media as a whole and its influence it can have by coining the society
2.	Mad max types of futures, fallout, very dystopian in one specific way
3.	Diversified futures, diversified issues. (Societal) problems are displayed in games and then either tackled with mystery like technology or fast forwarded into the future when this particular problem has led to a catastrophe
4.	Mainstream games don't want to take financial risks to develop something that is inherently different from what already exists, no thematic risks Indie games: more passion goes into developing games, they can create games with the message they want to convey. More communication between developers and players (emails, dialogue with developers, feedback) whereas mainstream games limit the communication with players to a minimum. Early access works better for indie games, as people accept a first buggy version but for mainstream games that are full of glitches and bug despite a lot of resources and a big team, players tend to be annoyed
5.	Techno optimist should not stay the only solution to the problems in games, to open up the social imaginaries' player can convey through these. Strategy games could implement this type of thinking (as background consequences for example) to start thought processes in players.

6.	Escapism is slowing down the process, as people don't want to engage with actual problems. However also games like Stardew valley work as a sort of positive escapism that paints a different picture of the future.
7.	Most research, policy, public thinking focusses on the 'technology will save us all' possibility. These limits engaging with the necessity of lifestyle, consumer behavior and value changes.
8.	If showing the same types of futures in games and other types of media are increasingly getting less important to certain age groups, than the worlds imposed on the player will impact their ability to imagine other futures (they will be less likely to be open towards them). Media and advertisement have already changed the perspective of ownership by branding and selling lifestyles, media can have influence. The way stories are told impacts the social consciousness.
9.	Games hold a special value, as the player can build strong connections to the protagonists, as he/she is playing the character himself / herself. By that choice with consequences can impact the player more strongly. Different relationship that to characters in movies or books.
10.	Games that work with transitions of societies on specific problems would be interesting for example with tipping points where the player has to make decisions that have different impacts on the outcome of a game. Having 'normal' characters that show interest in environmental protection without painting them as hippies.
11.	More transitional future that don't hold up technology as the savior
12.	From the website of One earth: "Our cultural story is at the root of overconsumption" putting less focus on technological innovation as the savior and more towards rethinking societal values and lifestyles. Researching how media could also influence the research and the realms of what is possible, also with former players are entering careers, becoming researchers and so on

	<b>Interviewee SI3</b>
1.	Urban future studios, collective imaginations, sociotechnical creation of futures, desirable futures
2.	-
3.	-
4.	Form of escapism, some dystopian settings are fairly easier to create for having a conflict in time of eco-crisis and fascist-crisis, the gaming culture appears to be pretty stuck in its ways (sci-fi masculine audience is being catered to). Back in the days Nintendo started to target young boys (more combat and brutality was introduced into games)
5.	Games are still maturing and developing, so there might be still a lot of room. Speaking from anticipatory research, giving the people or the audience agency will help reconstruct the current game sector (e.g. Pokémon ROM, fan-made games)
6.	Creating games that are 'outside the box' is an economic risk most mainstream game companies are not willing to take; indie games might be better off in that sense? Games however can't develop as freely as books, as they are bound by the resource and technologies available
7.	-
8.	Limitation of imagination -> it's there but it's not provable. Sci-fi as a parallel, influencing society through ideas sparked by sci-fi, sci-fi helps to visualize future in broad public (games might do as well) -> cultural undercurrent (not really measurable)
9.	-
10.	-
11.	Out of the box thinking, Bioshock like games. Semi-realistic futures that show other realities and bring this closer to reality

12.	Try implementing hybrid categories of narratives and motives of games that change in its unfolding (like a lot of game do). Following a normative approach. Look into history of commercial games to gain insights. From a conversation with a sci-fi writer: it is extremely difficult to think outside the box when creating new futures.
	<b>Interviewee T1</b>
1.	Teaching game studies at HKU, conducting game jams with students
2.	Most games have a 'follow the storyline' kind of narrative that forces the player to do certain things in order to proceed in the game. Mainstream games often have a pretty black and white worldview, with a clearly identifiable threat to humanity and enemies that endanger the protagonist. Threats to humanity are often vast and from an extreme scale (e.g. Horizon Zero Dawn) instead of a gradual change as it is in real life.
3.	-
4.	Conflict in some form is necessary to catch the interest of playing the game. No conflict would mean no game mechanics that would give the player some sort of reward 'Games is putting up arbitrary boundaries for yourself to overcome for a sense of accomplishment'. Interesting point: mainstream games are usually pretty homogenous, usually white males are the protagonists with few women, no unattractive women.
5.	Developments in technology will create more intelligent AIs for game content or to enrich the decision tree, VR filming things, contributions to unity
6.	Lack of resources, time constraints, (suspected) lack of interest of players, creating more diversified world is more complex, hence very tech intense, clichés
7.	-
8.	-
9.	-
10.	-
11.	-



12.	Students start creating from the possibility space of games they are familiar with until they learn enough soft and hard skills to start developing new ideas. As teachers, they try a balancing act between getting the students ready for the working life, make sure they will get jobs, but also to spark creativity to think outside 'the box'
	<b>Interviewee DES11</b>
1.	Studied illustration and interactive design. By chance she came into the field of developing games, where she developed 'Perfect Woman' as a graduation project for which she won price at the San Francisco Indie game festival. Currently she works at ustwogames in London
2.	Mainstream games usually show male heroes, fantasy future, technical future
3.	-
4.	Young, male developers with technical interest and expertise dominate the game sector at the moment. Their interest (themes) are overrepresented, structural reasons for as still fewer woman study IT or programming
5.	More women in game development needed, that balance the overrepresentation of technical / alien futures out. Workforce needs to be diversified (there actively aiming for this at ustwogames). On the GDC conference 10 years ago she was almost the only women, things are starting change. With easier tools everybody can develop games (UNITY)
6.	Developers don't want to get too political
7.	At her company she does not experience these limitations as strongly as in the 'classical' game studios. When they pitch ideas for games, they have to check them with the values of ustwogames. However, she experienced that games cannot become too political and have to remain relatively superficial
8.	-
9.	-

10.	Lea said that she would be interested in a shift towards more 'arthouse' games, that are targeted at educated adults that like to read NYT for example. She sees a bit opportunity there, as almost everybody possesses a smartphone nowadays. Indie games try this, however, often lack the budget to really produce a sound story
11.	-
12.	Even having utopias would work as a game setting, since you can always find a motivation for the game.
	<b>Interviewee DEVI1</b>
1.	Indie game developer
2.	Story needs a hero, power to change the outcome of a story. Conflict is usually immediately, withholding information.
3.	-
4.	Safe option for game developers: money, limitations, world building, players know what to expect if they always get the same content
5.	Utopias would offer a conflict as well. Utopias would also deliver a conflict in which a game could be set, utopias basically not much different from dystopias if you think about it (regulations, laws, space) but the narrative around it is different.
6.	Resources, money, need to create a narrative when an 'in between world' between dystopia and utopia is used in a game, which requires a lot of narrative (too costly)
7.	Once developed a game with a deer in the forest just wandering around. A lot of social media attention but eventually he had to stop the project as all the 'necessary' conflict for gameplay took away all of the game's atmosphere. Only positivity was incredibly hard to accomplish.
8.	-

9.	-
10.	Would be interesting to develop games that feature some sort of unravelling of a utopia
11.	-
12.	-
	<b>Interviewee DEVI2</b>
1.	Two-person indie game developing studio that specifically try to develop games that is not mainstream. He studied multimedia design and met his girlfriend there with whom he started Ratking. Most of his developing and programming skills are self-acquired. They create their own games but also take orders from companies
2.	Epic games (Unreal Tournament, Fortnite)
3.	-
4.	In the past years youtubers had significant influence on the game sector, games they touched were played and sold. Today youtubers play only a very limited amount of games (from 500 to 20). Also, shooters are easier to construct in a dystopian setting which does not need to be exactly defined. The influence of publishers on the developing studios has become less and less over the years through kickstarting campaigns and early access.
5.	Games are getting more elaborate and intense, huge open worlds but there are still the same things happening in these games. Technical developments allow for improvements, AIs used for making games increasingly improve and make developing games easier. However, through easier tools (Unity) more people enter game development
6.	Most developers are gamers themselves; therefore, new content is rare.
7.	In a game they developed named TRI, they struggled with adapting the game to the tools and resources they had. The story required too many details which they had to cut out then. Ran out of money and had to get a publisher which then gave them a deadline. Even games like Minecraft and

	overcooked had a conflict in the background going on that was totally unnecessary
8.	-
9.	-
10.	Interesting to have more art games, that are developed by people that come from outside the game sector to get more insights into various topics
11.	-
12.	-
	<b>Interviewee DEVI3</b>
1.	Has been developing Unturned for the past six or seven years. Video games, and especially creating or modding them, have been a passion of mine for as long as I can remember.
2.	I agree with you that dystopian and apocalyptic futures are the most common. I don't think this is a good or bad thing
3.	Eco is an interesting game that sort of represents an alternative future on a sustainable planet. Sci-fi games e.g. Star Citizen typically present a more positive future than earthbound ones.
4.	Combat is easier to make a game from than a peaceful future.
5.	Naive answer, but I think it's as simple as a game designer / developer putting together some fun new ideas and mechanics.
6.	-
7.	Hasn't felt any limitations. He thinks, that any unusual changes to new games would be well received.
8.	-
9.	-
10.	No preference. Whatever's fun and interesting, regardless of whether it's more apocalypse games.

11.	-
12.	-
	<b>Interviewee DA1</b>
1.	3D artist internship, lead artist. Now creating mobile, VR, casual games at Team 6 (racing games, shooter, tempo runner) Mainstream game company
2.	Hatred, mass murder
3.	-
4.	Dystopias are interesting, they distance themselves from reality, pushing against authorities in the games, something they cannot do in real life. Humans are not frustrated by nature but by governments, that's why it is a common theme to have oppressive regimes. Reaching most player types is also important to be able to sell the game really well. Entertainment industry as a whole is dictating the way of books, movies and games. There has never been so much knowledge available to everyone, young people are rebelling against reality by dystopian types of futures in which they can strike back.
5.	Mundanity is working in games as well; epic conflict is not necessarily needed (e.g. farm simulator). Introducing moral choices (this war of mine, fallout) adds to the game mechanics and allows to reflect on behavior
6.	To diversify games expensive measures are necessary. Decision and story tree cost a lot of resources, the closer it is to reality the less room for error there is, narrative freedom is higher in post apocalypse. However, shooters are 'in fashion' at the moment.
7.	In the game 'Road Rage' they used a dystopian setting just to create an easy and cheap conflict / motivation into the game
8.	-
9.	-
10.	Enjoys the game farm together, in which there is no conflict and even no failure (plants can't die)

11.	-
12.	Game mechanics need to be pleasurable, Zen-games (flower, journey) are on the rise that focus on something completely different than mainstream games
	<b>Interviewee P1</b>
1.	Dutch interactive entertainment company, indie game studio (mostly mobile phones) Fan of video games and makes small games as a hobby. Bachelor's degree in Business, most knowledge is self-thought.
2.	Recent high-quality mainstream games like to simulate a post-apocalyptic future, which is amazing. With graphics these days, it shows the realism of what such a future can look like
3.	-
4.	I think the gaming sector isn't structured much different than for example music, or film making. I think it's a multimedia thing. They all seem to follow the same pattern
5.	Game developers need to innovate the idea of a different future, instead of using the same old (yet successful) formula. It takes a risk. I think public interest would be the trigger.
6.	The risk of failure could hinder a change.
7.	To me, the gaming experience is important. If the scenery contributes largely to my gaming experience, I'd rather have something refreshing instead of the same old world.
8.	-
9.	-
10.	A more peaceful future, in which the world isn't a ruined wasteland.
11.	-
12.	-

	<b>Interviewee TT1</b>
1.	Researching two fields: first field cybernetics, technology and socialism --> Burers (?) work, trying to use technology in a way to boost system change and second field in relation with designing table top RPGs
2.	-
3.	-
4.	Large developers tend to go for a longer production and release period of 5 - 10 years, themes move therefore really slow (Hit making procedure), similar to table top RPG, where games need to last 7 years as well (while keep adding add ons). Kuhn' theory: working with a system 'normal science', paradigm shift --> people get used to it. No paradigm shift in table top, though in game sector it's happening. Big studios are defining consumer taste, indie designers are still tied to the market, only exception is kickstarting projects --> conservatism in design
5.	Content that is at the fringe of what is out there can drive innovation. Mainstream games can be drivers as well as they can push for new technologies used and games as well as new themes due to big teams and lots of resources, which is not possible for indie games in the same way. To diversify themes, it is important to bring people with different ideas (e.g. artists) into dialogue with game developers. Avantgarde could be a driver for artistic change.
6.	Thematic conservatism: 1. Market driven 2. game designers identify strongly with games (put all their education and dedication into it) which creates a creative and mental 'tunnel vision' that makes out of the box thinking difficult 4. Technical development, designers want to create games that remind them of childhood games --> creative conservatism. Predominantly white males with technical education and interest in developing stage -> limited range of life experience and topics interested. Chicken and egg problem.
7.	When designing a table top RPG he ran into some limitations that are comparable to the ones from the game sector. Table-top-role-playing indie

	games are very small fraction and not much variety in the field (very niche market)
8.	-
9.	-
10.	Lots of themes to explore. Thematic diversity is very limited. Multiperspectivity, animals focus, as themes resilience, continuity, change.
11.	-
12.	For the game overwatch they tried to extend the target group by creatively designing the content and visuals leading to a bigger group of audience. When looking at mainstream movies, the flashier the better to lure people into the cinemas, similar to the game sector
	<b>Interviewee Y1</b>
1.	Started playing games at a young age, founded a testing site for electronic gadgets and then started a let's play channel on YouTube
2.	He mostly plays shooters and RPG's: One big villain that holds all the power, classical hero, variable of the unknown, futuristic appearances, zombies, nuclear fallout
3.	-
4.	Exciting interesting futures and worlds that are not tangible, gamers can flee from reality, alienation, games should not be too close to reality. Interest of players is not going to change in the coming years, young players prefer battle royal kind of style and disregard stories completely.
5.	Games need sense of achievement, feeling of improving oneself, trophies. Studios that create exceptional content, game sector is growing. Kickstarter campaigns, crowdfunding, early access, simple game mechanics can boost changes in trends



6.	Peer pressures, he is playing games that his friends are playing, since he wants to play together with them. The new generation of gamers have a high interest in battle royal games and are not interested in a big back story / single player mode. Games should be used to escape reality, not to think about potential threats that might affect us. Games orientate on movies and media, nothing new can be invented. Have to be politically sensitive and avoid causing anxiety about real life problems.
7.	Newer generation prefers battle royal. A lot of new games lack soul & character and empathy for characters, as they personality remains relatively superficial
8.	-
9.	-
10.	More games with morale decision and strong character development could surely also include different types of futures
11.	-
12.	-
	<b>Interviewee Y2</b>
1.	YouTube, Let's plays. Otherwise he works in as a movie/ advertisement producer
2.	Escaping daily life / reality. Morbid fascination with urban destruction
3.	-
4.	Gaming sector: the joy of use, Game mechanic. Pop culture is present in live with technology influence our live (ordering a pizza online), however in games a distant reality is wanted, escapism. Parallel universe, fascination with violence and war, players can try out things without consequences
5.	As with YouTube that everybody can create content and upload it, with new developing tools amateurs can create games as well. More topics, braver approaches towards new story -> this can influence mainstream game makers as well

6.	Big producers want to create something that is being played by a lot of people. Creating multiplayer games with DLC is more economic than producing always new games. In movies you can create unique setting with easy tools vs. in games it is complex and expensive to create new and unique game settings. Old white man (inertia towards change)
7.	Something new is expected, but it can't be too much outside the scope. With making movies, every movie is a compromise to adapt to the wishes of the producer
8.	-
9.	-
10.	Vampire time travel games (laughingly)
11.	-
12.	-
	<b>Interviewee(s) G1</b>
1.	Duckfeed Slack, multiple gamers
2.	Not so much not painting a complete picture, just not doing anything interesting or new. The government/anonymous megacorporation is bad because it wants to control everything in the same way as eight other similar fictional dystopias etc., they may be 1984 or they may be brave new world, but either way it's not saying anything new. Doesn't stimulate original thought about real societal complexity? Deus ex has a little bit of that with the 'all the conspiracy theories are real' things but bring that more into the foreground. most of the SF dystopias I'm thinking about when considering past games tend towards either "totalitarian" or "wasteland".
3.	-
4.	Dystopias obviously can fit well with combat-focused games, but externally threatened utopia/optimistic settings can do that side as well. For mechanics that better suit specifically more dystopic settings, it's the 0451-verb set - sneaking, infiltrating, observing. Perhaps dystopias seem both more likely in general and specifically more suited to a protagonist-against-

	<p>world style conflict. It places you as an underdog (something psychologically appealing), it places you as someone who knows something most people don't (something _very_ appealing). I think the limitations are largely of imagination, related to the fact that for most kinds of game stories that exist, fairly stock settings are good enough.</p>
5.	<p>And games are getting better at telling smaller, more personal stories that don't rely on The Government Is Bad as a motivator. The need for a more unusual setting comes when the thing driving you is narrative or ideology or character more than fitting an existing genre. (With other media, the setting is much more front and center, often.) The rise of indie games and increased availability of distribution is changing all of this if you look at games broadly also.</p>
6.	<p>As far as games I like to play, the act of working against dystopian forces is satisfying - it's not a popular trope completely by accident. I think there's more room for setting to be more incidental to a game than there is for other media, let's put it that way. If the generative impulse behind your game is mechanical, there's more room to choose a setting for aesthetic reasons rather than narrative/ideological/whatever. Systematizing peace is inherently difficult and usually boring.</p>
7.	<p>Regarding the idea of a sports game in a utopia, I was working on a TRPG inspired by Pyre, Wipeout, and Speed Racer set in a utopian republic a while back. I stopped work on it because when I talked about it, people couldn't understand what I was talking about.</p>
8.	<p>More self-serious dystopic games, everyone tends to see themselves as the lone wolf who will take on the system, because that trope is so familiar in fiction.</p>
9.	-
10.	<p>I once asked this question, and some said - imaginations of the future that focus on everyday life would be great to see. I would be interested - like I</p>

	said, I think more ambiguous societies will probably work better if Society per se isn't the focus of the narrative.
11.	-
12.	A genre that seems to be different in some of these elements is strategy/civ/sim city type games. Since those games are explicitly about the development of civilizations/about societal systems. To build on the comments about transhumanism, I would like to see more games be comfortable with representing cyborgs and body cybernetics as liberating, rather than simply a vector for the all-powerful state/corporation to take over and control everything (whether directly or indirectly). I think that's a legitimate concern, but I'd like to see other possibilities. It seems that over the past few years (as with other media), games have represented technology the apple of knowledge or Icarus flying too close to the sun. There seems to be a lot of themes that are playing with technology creates a social bill that must be paid through a "fall" or collapse, after which we must learn the hard way what humanity is *really* like.
	<b>Interviewee(s) G2</b>
1.	Waypoint, multiple gamers
2.	I think most games, particularly sci-fi orientated games have more in common with the imagined futures portrayed in movies more than they offer up anything wholly original
3.	-
4.	I don't know if that's the intended result. I consider it more of a product of ideology. We don't want to imagine a moderately shittier existence where things are just worse. It's unappealing to envision a future that isn't utopian in some form, and the post-apocalyptic future is utopian in that it's devoid of the concerns of the immediate future. To respond to this question specifically: capitalism, basically, and the superstructure that supports it. - The classic 'dystopian' future acknowledges where our society is headed, something which I believe most educated people understand, but most of us are unable to attribute that erosion of living standards to the very system that sustains our own lives. Thus, a lot of creatives feed these anxieties into

	large, loose and confused allegories for environmental and societal collapse: zombies, nuclear devastation, even Blade Runner-future is sufficiently divorced from the actual causes of how society is structured to be little more than an aesthetic.
5.	-
6.	-
7.	-
8.	To me, the relation is the same as with any other cultural text: it both reflects and influences how people imagine possible futures. Sometimes a particular idea might spread very far because of a game (as it would through TV, or a novel, or any other form of mass media), but comes from a more local or regional context, but that's due to the globalized world.
9.	-
10.	-
11.	-
12.	-

## Appendix V Questionnaire

1. Can you think of something else that could be add to this, that's particular for the futures displayed by games?
2. Why do you think are these futures types present in games while others are absent?
3. Why are some futures overrepresented?
4. From your standpoint: why do you think certain themes like a system that is not based on capitalism are rare? Or the presence of rather apocalyptic events?
5. What type of future could be important to convey through games to foster sustainable thinking?
6. How would you describe the relationship of players that consume games as a type of media and their ability to anticipate (sustainable) futures?

7. What could the effects of this landscape have on the players' ability to imagine futures?
8. In your research: does imposing fear / painting pictures of grim dystopias work as a motivator?
9. What can be learned from the field of anticipatory climate governance of engaging people to transforming processes?
10. Do you think the special intrinsic value of games (getting familiar with the world, parameters, identifying with the protagonist) could benefit the broadening of social imaginaries?
11. Do you think there are possibilities to diversify the types of futures displayed in games?