From Cultural Sustainability to Culture of Sustainability: Preservation of Games in the Context of Digital Materiality

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ABSTRACT
In this paper, we set out to explore some of the most prevalent questions regarding cultural sustainability in the context of preservation of digital games. Since the 1980s, the concept of sustainable development has been successively expanded to incorporate not only environmental and economic aspects but also the social and cultural, as well as relating to values such as human rights and broadly understood equality (Stylianou-Lambert et al. 2014). We would like to examine what kind of issues and considerations should be taken into account while developing a holistic approach to game preservation that also supports a culture of sustainability focused on broadly understood game heritage. What kind of unique challenges do game cultures and ludic artefacts present in this context? In our paper, we will look at a national case study of Finland where innovative and progressive approaches are currently being developed.

Keywords
cultural sustainability, digital materiality, game heritage, game history, game preservation

INTRODUCTION
This paper is an interdisciplinary study situated at the intersection of game history, heritage studies and sustainability studies. In recent years, amidst growing concern about the climate crisis, the topic of sustainability has become more visible in public discourses. This has happened as sustainability commitments are implemented into more projects worldwide in an attempt to meet the 17 Sustainable Development Goals (SDGs) as well as the goals outlined by Agenda 2030, developed by the United Nations. Past decades worth of challenges in this area are being critically reviewed, opening a discussion on the principles of sustainability. Earlier, sustainability was understood as being supported by three pillars: economic, ecological and social (Elkington 2004). Sustainability is not only related to restricted environmental issues; lately, the concept

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of cultural sustainability has been introduced. In many cases, cultural sustainability has been perceived as a "fourth pillar" of sustainability (see Pascual 2012) but in this paper we examine it as a root concept in the spirit of a wider conceptualization of culture, one referring to all human actions.

Every cultural practice is part of the discussion about sustainability. Game cultures, including game industry and game heritage institutions, are no exception. From an ecological perspective, digital games as a cultural practice, as well as an entertainment industry, have a significant carbon footprint (see Mayers et al. 2015; Mills et al. 2019). This is primarily due to the use of energy-consuming computational technology, for graphics, online gaming, and nowadays also streaming. Furthermore, high-end computer graphics solutions are being developed and systematically becoming obsolete because of the video game's pursuit of photorealism. According to research conducted at the Berkeley Lab (2019), "computer gaming accounts for about 5 percent of all residential energy use in California". There are multiple initiatives dedicated to the greening of gaming, including calibrating hardware for more efficient work – examples include the so-called Green Gaming project at the Lawrence Berkeley National Laboratory, U.S (ibid.), or game industry contributions to offset the CO_2 footprint (United Nations 2019).

From economic, as well as social, perspectives, the digital games industry has received a lot of criticism regarding its poor work culture practices, including the extensive crunch times developers often face, as for example, the recent controversy around the production of the game *Red Dead Redemption 2* by Rockstar Studios (2018). Social and economic sustainability is the focus of the Game Workers Unite agenda. The question of the economic sustainability of independent games, which are traditionally smaller in cost and scope when compared to "AAA" titles, was recently explored in a paper by Whitson et al. (2018). Finally, it is worth noting that the concept of sustainability (especially, but not only, environmental sustainability), is the topic for a growing number of serious games (see Fabricatore and Lopez 2012)[1], as well as mainstream entertainment games. Alenda Y. Chang (2019) argues in her book *Playing Nature: Ecology in Video Games* that games designers, and more generally game cultures, not only can but should engage with ecocritical perspectives, as well as concepts directly related to sustainability. She recognizes that the medium provides some unique representation possibilities in that matter, as for example, "both analog and digital games offer some of the most thought-provoking representations of collapse dynamics in our culture today" (ibid., 223).

Since the invention and launch of the concept of sustainable development, the idea has been crucial to the administration and institutionalization of the UNESCO world heritage. It has also been an important principle in the organizing of global, local, and translocal cultural heritage, both tangible and intangible. It is central to conducting and governing various more-or-less indigenous cultural heritage communities. In this paper, we would like to explore how issues of sustainability are present in the heritagization of digital game cultures. First, we introduce the theoretical framework of cultural sustainability. Then we examine digital materiality: that is, digital games and game cultures in the context of cultural heritage and sustainability. We ponder on games' dual nature as digital and non-digital objects. The last section is about the case study of the present state of affairs in Finland, with a special focus on the Finnish Museum of Games and its plans regarding cultural sustainability.

DISCOURSES ON SUSTAINABILITY AND CULTURE

In this section, we inspect the history of the concept of sustainable development and its adoption into institutionalized discourses. Then we consider cultural sustainability as a root concept that encompasses issues related to heritage, diversity, locality, identity

and ecological culture, among other concepts. We also discuss how various aspects of sustainability are relevant to digital game cultures.

In the European context, the idea of sustainable cultivation (in German: *Nachhaltigkeit*) derives from the 18th century terminology used in Saxonian forestry and management of natural resources (Brightman and Lewis 2017, 3). The modern concept of sustainable development was born in the 1980s during the operations of the World Commission on Environment and Development (WCED), which published its famous report – better known as the Brundtland Report[2] – in 1987. The historic document advocated for a new global strategy which would join the goals of economic development with the needs of the environment. In a widely-quoted phrase, the Brundtland Report defined the concept of sustainable development as one that "meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, chapter 2.4.). The next step was to transform the newly-introduced idea of sustainable development into an applicable agenda for environmentally and socially responsible politics, which took place at the Rio de Janeiro Earth Summit. This publication became the famous "Agenda 21" (United Nations 1992), which is considered a turning point in the cultural history of economics as it introduced a new set of ethics for global businesses.

Since the mid-1990s, the concept of sustainable development has been a cultural construct supported by three pillars: the ecological, the economic and the social. This structure, and the new culture of business ethics it represents, is usually referred to as the *triple bottom line.* Its development dates back to 1994, when John Elkington suggested a new kind of sustainable responsibility for economic actors. According to Elkington, businesses should report on their environmental and social impact in the same way they are held accountable for their financial actions (Gray and Milne 2004). The triple bottom line requires companies to consider their impact on issues of social and environmental concern, and steers the economy in a more sustainable direction.

Accounting is one of the most important forms of knowledge used by business, which means that the invention of the triple bottom line might, in the future, appear to be a fundamental turning point in the cultural history of the embeddedness of global business (Lipartito 2013, 605 and 619–620). The ethical suggestion here was that companies should be governed by a wider set of stakeholders than just shareholders (Doane 2004, 85–87). In its own time, the triple bottom line was a radically different way of looking at enterprise, and yet it was widely applied to the governing of global and national organizations. It was a cultural invention and became a cultural heritage of the responsible businesses.

As a result, global video game companies listed on a stock exchange (such as Nintendo) publish annual reports, known as Corporate Social Responsibility (CSR) documents, in which they inform on how the internal company policies are addressing issues defined by the triple bottom liners. For example, according to the latest report, the giant from Kyoto is concerned about the "human right and labour issues at manufacturing sites" (Nintendo 2019, 11), at least of their production partners, as the company itself does not own fabrication facilities. As of December 2019, among 51 game industry companies rated by the sustainability management tool CSRHub, the highest ranking was Ubisoft Entertainment (CSRHub 2019). One of the recent games released by this studio, *Assassin's Creed: Odyssey* (Ubisoft Quebec 2018), reportedly (Batchelor 2018) did not require a "massive crunch" (meaning overtime hours), which likely would have been the case in the past. Considering this, it may seem as though Ubisoft and other developers are moving in the right direction, at least in this regard. However, the overall status of the gaming industry in this area still leaves much to be desired. It seems that the bitter truth is that, so far, video games are more successful as educational tools to

introduce the principles of sustainability, than they are at applying these principles on an industry level.

As Soini and Birkeland (2014) have proved, there is currently a growing interest in expanding the traditional tripod model of sustainable development with a fourth pillar focused on culture. During the second decade of the 21st century, the emphasis for promoting sustainability has been on cities and the participation of their citizens. During the 2010s, cities were envisioned as primary sites for cultural production and governance, and were the main concern of cultural policy. Culture itself was seen as a tool for constructing citizenship. The participation in culture takes place through various channels, including internet, public spaces, and work. *Rio+20 and culture. Advocating for Culture as a Pillar of Sustainability* (2012), an influential report from the Committee of Culture of United Cities and Local Governaments, introduced 'culture' as a fourth, missing pillar of the model of sustainability, and placed it alongside the three other pillars (Pascual 2012).[3]

According to Soini and Birkeland (2014), there are several other options to connect culture to sustainable development. It is not necessary to consider culture as the fourth leg of the "ecological, economic and social" model. Culture may also be seen as "the foundation of or necessary condition for meeting the aims of sustainable development in the first place, or as a perspective through which understandings of social, economic, and environmental sustainability may appear." (ibid., 215). It is fair to say that culture has always been present in the triple bottom line, consolidating the intersection of the economic, environmental and social.

Soini and Birkeland (2014) analysed the discourse on cultural sustainability and found seven different clusters of contextualized aspects. According to their study, the discourse of cultural sustainability clustered around the concepts of heritage, vitality, economic viability, diversity, locality, eco-cultural resilience and (overwhelming) eco-cultural civilization. As we can see, cultural sustainability is a concept that considers a wide range of issues related to the heritagization process, such as identity and social inclusion. However, before we get to the broad context of game cultures in that matter, we would like to discuss the underlying issues of digital games' materiality.

DIGITAL MATERIALITY AND SUSTAINABILITY OF GAME PRESERVATION

In this section, we explore the notion of digital materiality, understood here as a set of issues related to material characteristics of born-digital artefacts. Generally speaking, material durability of objects can be perceived as advantageous from the perspective of sustainability. However, it can be also considered a significant problem, for example, if we think about the use of plastic in the gaming industry. Drawing on various works on the materiality of digital collections, we engage with other media and heritage traditions, as well as cultural studies inspired by the materiality turn. Then, we investigate how the double nature of video games affects the preservation efforts in practice, as the "virtual" nature of these artefacts challenges the very principles of sustainability.

There is probably no other case in game history that inspires the discussion on materiality as much as the case of *E.T. The Extra-Terrestrial* (Atari 1982), a game for the Atari VCS that was mass-buried in a dump site in New Mexico. Atari was so confident of the forthcoming success of its adaptation of the – then – highest-grossing film of all-time, *E.T. The Extra-Terrestrial* (dir. Steven Spielberg, 1981), that it produced an unprecedented number of cartridges, even starting rumours that – at the time – there were more copies of the *E.T.* game then there were VCS consoles (Rains 1997, 43). The game's production was very rushed and the release version was not well

received by players or critics. In fact, Atari's *E.T.* is often referred to as the "worst game ever", a title that was even embraced by the game creator Howard Scott Warshaw. As a result, millions of unsold cartridges from around the US were dumped and buried in a landfill next to the small city of Alamogordo, New Mexico. This event became the so-called "landfill legend", and the "after-life" of the game was studied in detail by Raiford Guins (2014, 207–235). Indeed, it is an especially fascinating case study not only for game historians, but also for cultural historians in general, as it focalizes several issues related to digital materiality.

In 2014, as a part of the production for the documentary *Atari: Game Over* (dir. Zak Penn, 2014), the dump location was reopened and some of the discarded cartridges were excavated (Hilliard 2014).[4] As Guins (2014, 210) contemplates: "[t]oday's next next-generation game and game console are tomorrow's e-waste, with the small exception of those candidates that find their way into (…) cultural institutions". Ironically enough, today every game museum would like to have a used *E.T.* game cartridge in their collection. The once devalued game now has a special, cult value (ibid., 227), as it represents a turning point in North American game history and the blindsided hubris of Atari that is commonly discussed as one of the reasons for the game crash of 1983 (e.g. see Wolf 2012, 3–5).

Marlene Manoff, during her time as a Senior Collections Strategist at the MIT Libraries, explored various problems related to the materiality of digital collections. In the spirit of new materialism, she took into account the "physical infrastructure of technology" (Manoff 2013, 276), as opposed to the earlier approaches focusing on the "immateriality of digital objects" (ibid., 312). In a time of exponential growth for cloud computing and remote access to most of humanity's digital resources, it is easy to forget about the material aspects of new media technologies. However, all of these services and resources need physical infrastructure, such as underground and underwater cables or data centres. Contrary to the 1990s-born conceptualizations of digital revolution as taking place somewhere in the elusive and somewhat immaterial cyberspace where one could imagine atoms turning to bits (Negroponte 1996), the 21st century reality is far more corporeal. As Blanchette (2011, 1042) points out, "bits are necessarily both logical and material entities". Every video game, although a digital artefact, has to exist on some sort of storage device or physical server; it also needs a gaming platform and a screen to display it, and these devices are susceptible to decay like every other material thing. Although we have only recently started to think about all of this in a more responsible way, the digital revolution was producing a material trace, a growing pile of e-waste, since its very beginning.

Games are already becoming a part of the so called anthropocene, as digital waste creates future fossils (see Gabrys 2013, vi). In *Geology of Media* (2015), Jussi Parikka introduces new approaches to media materialism, exploring beyond the hardware focus of the German media archaeology school (e.g. Kittler 1999) and drawing on Donna Haraway's concept of naturecultures and other posthumanist frameworks manifesting environmental sensibility. Parikka uncovers chemical, mineral and organic layers of the electronic devices we use every day. As he frames it, "media history is a story of relations between the organic and nonorganic and the waste products emerging from the use and misuse of materials" (Parikka 2015, 25). He is interested in questions such as "how is the earth being mobilized as part of the creation of media technologies, in terms of the materials and the labour involved" (ibid, 214). When we think about various chemical elements used in modern computing, one of the first things that might come to mind is the lithium used in lithium-ion batteries. It is a good example of a case where a new materialist approach can provide valuable insights into the context of new technologies productions, not only from the ecological but also from social and economic perspectives, looking, for example, at the labour practices and sustainability.

Digital materiality is often the focus of game collectors' and hobbyists' agenda, as often private museums or early initiatives were based on private collections. Retail boxes of rare games, such as the Finnish titles for Commodore 64 computer, such as *Painterboy* (Chart Top Design 1986) and *Uuno Turhapuro muuttaa maalle* (Hytönen 1986), are sought after by collectors, as their material presence is something that can be displayed and enjoyed in a way that the gameplay itself will not offer. For example, Computerspielemuseum in Berlin has a significant collection (in the thousands) of game retail boxes stored in their basement.

In practice, the digital materiality of games affects preservation efforts. This is especially visible when working on museum exhibitions, where material artefacts are a key component of the exhibition praxis of professional museums and hobbyist collectors alike. Material artefacts are by no means the only exhibitable content in game exhibitions, but are instead one component together with playable games and various metatextual and paratextual artefacts (Consalvo 2017; Švelch 2017). Contemporary discussions on digital games preservation often focus on the subject of keeping games playable (e.g. Pinchbeck et al. 2009; Guttenbrunner et al. 2010; Delve and Anderson 2014), while not taking into account nor giving meaning to the various forms of intangible, tangible and digital artefacts existing around games. A holistic approach to preserving video games heritage involves numerous metatexts and paratexts, ranging from preservation of play (Newman 2012) to developer diaries, player generated content and marketing materials (Nylund 2018).

In comparison to other cultural forms, games are rarely (if at all) the main focus of digitalization efforts, yet the number of ludic artefacts identifiable in databases (such as Europeana Collections) is slowly growing. Analog games represent a challenge for digitalization teams, as they often involve 3D objects, and are thus more complex than just a book (or a board game) that can be simply scanned in 2D. However, whatever challenges analog games present, they are surpassed by the problems related to the preservation of digital games. As digital games are a comparatively new medium and virtually all of the artefacts are under seventy years old and thus not in the public domain, the accessibility of titles depends on local legal solutions. The new EU Copyright Directive (see European Union 2019) includes an exemption for cultural heritage preservation purposes that can be applied also in cases related to video games (i.e. a memory institution can make copies of video games in their collections without a breach of copyrights). One of the most experienced entities when it comes to dealing with the complicated legal status of various vintage games (e.g. abandonware), is the online store and game launcher GOG.com, which specializes in releasing classic video games for contemporary platforms.

In the last year, we have seen a rapid growth in the number of publications addressing climate change and heritage work (see McGhie 2019a; 2019b) and proposing specific solutions to the existing problems with digital collections. However, as Pendergrass et al. observe (2019, 173), "recent work on environmentally sustainable digital preservation focuses primarily on the electricity use of technological infrastructure, which addresses only a portion of the full environmental impact". This is insufficient, and sustainability policies should also "address the impacts of ICT throughout the component life cycle" (ibid., 177). Furthermore, the team advocates for an effort to avoid duplication in born-digital archives, as the process of so-called "deduplication" would improve storage capacities (ibid., 182–83). While these proposals sound very common sense and easy to apply, some other solutions that are being suggested would present problems. For example, the researchers suggest that we must not only "reduce the amount of digital content that they preserve", but also "the resource-intensity of its storage and delivery" (ibid., 177). This would involve practical solutions such as scan-on-demand instead of digitizing everything at all times, or only the temporal

availability of digital content based on, for example, a subscription, rather than a more accessible open access model. These measures seem rather radical and will most likely be disputed by commentators. Hopefully, in the upcoming discussions to come the broader questions of sustainability culture will be addressed, including topics we consider in the next section.

CULTURAL SUSTAINABILITY AND GAME HERITAGE

In this section, we take a closer look at digital games as an emergent heritage and what this means for cultural sustainability goals. We analyse in detail the various questions that are important for a holistic approach to game heritage preservation, such as identity, diversity, locality and social inclusion.

Digital games are an example of a so-called emergent heritage, one that is only beginning to be formed. Because "[t]he emergence of cultural heritage depends on a material or immaterial remnant of the past that is valued as historical evidence and recognized as authentic by a historical narrative" (Suominen et al. 2018), the importance of preservation for any heritagization process cannot be overestimated. However, as the same study indicates, "[t]here is no cultural heritage without a community or at least a group of active participants" (ibidem). Furthermore, emergent heritage is an interesting situation when many different stakeholders and cultural actors are invested in supporting preservation practices and other heritage-related activities. At the same time, all of the parties involved, being members of the cultural heritage community, are performing identity work (Sivula 2015, 64–67) that leads to establishing later policymakers' actions and frameworks for institutional preservation. It is important to remember what is at stake here: what will be passed down to "future generations as the material and immaterial proof of a country's heritage". But the heritagization process itself happens now, as "heritage is constructed and used in the present to advocate for national, local, and individual identities" (Stylianou-Lambert et al. 2014, 567).

Historians of video games interested in local histories (e.g. Wade 2016, Švelch 2018, Swalwell forthcoming) often argue that there is a significant imbalance in how various regional histories of games are represented in mainstream historiographies (for more on game historiographies, see Suominen 2016). Dominant narratives tend to focus on North America, several countries of Western Europe (e.g. UK), and Japan. This situation can be compared to the regional imbalance seen in other heritage sectors; for example, the UNESCO World Heritage List is dominated by sites located in Italy (see Reyes 2014). The existing problem has been thoroughly investigated from postcolonial perspectives, also in the context of how general history is represented in video games (see Mukherjee 2016; 2017). Other authors that have engaged with local game histories do so in the context of global south (Penix-Tadsen 2016) and semi-peripheral countries, such as Melanie Swalwell (2010) on New Zealand and Patryk Wasiak (2014) on Poland. Much work still has yet to been done, as the *Videogames around the World* (Wolf 2015) anthology seems to suffer from the same problems as the UNESCO list, given that it is predominantly focused on Western countries and lists entries such as "Switzerland" and "Africa" that are of similar length. Considerations should be made not only for peripheral histories in a geographical sense, but also from the temporal or other perspectives, exampling, for instance, minor platforms in game history like the NeoGeo or Vectrex (Nicoll 2019), or how video game cultures were intersecting with other media forms, such as demoscene (Reunanen 2017) or hacking scenes (Alberts and Oldenziel 2014).

Historically, video game culture has struggled with the notion of a gamer identity that is inclusive of gender, race and sexual orientation (see Shaw 2012; Shaw et al. 2019; Nooney 2013). These issues were prevalent in gaming culture, as Kirkpatrick's (2015)

study of sexism in the computer games magazines of the 1980s and 1990s shows. In the last decade, probably the most recognized controversy regarding game cultures was the so-called #GamerGate movement, which, among other things, represented "protectiveness of the male space of video games" (Mortensen 2018; on a broader context see: Jong 2020). As a consequence of these cultural tensions, a popular debate on what is considered legitimate in contemporary games will probably continue for many years. An interesting point was recently put forward by Consalvo and Paul (2019) who are interested in the question of "what makes something a real game" (xxxvi), like in earlier discussions on what makes a "real gamer" (Kirkpatrick 2015). They are specifically looking at a rift between casual mobile and social network games (e.g. published on Facebook) and the AAA mainstream titles, analysing the rhetorics used by game critics and audiences to dismiss the former and legitimize the latter.

Another issue to consider is the accessibility of game heritage. By accessibility we mean not only design practices that, for example, make exhibitions usable for disabled visitors but also those that allow for international audiences (e.g. English translations of local languages), and, most importantly, an exploration of historical narrative that includes diverse audiences, based on earlier discussed factors, as well as those affected by impairments of intellectual, physical or sensory nature. Modern museums and cultural institutions are increasingly responsive to the needs of disabled visitors and other accessibility issues, which shows a recognition of the importance of making heritage accessible to all. In this context, we should refer to the question of interfaces, a specific video game issue. Artistic interventions like *Octopad*, developed by Patrick LeMieux and Stephanie Boluk, can open up a discussion on the accessibility of game heritage; in fact, the installation was inspired by the works of Richard van Tol and Barrie Ellis posted on the Game Accessibility Forums. *Octopad* was exhibited at GDC 2019 in the Alt.Ctrl section, as it "breaks a NES controller into eight game pads with a single input each, turning single-player games into multiplayer experiences built around communication and collaboration" (Couture 2019). These problems are a good proof that the cultural sustainability of game heritage requires memory institutions working with heritage communities, not far from the British tradition of community work developed by Alan Twelvetrees (2008). This approach should assure maximum possible inclusivity and will be reactive to the changing needs of the heritage community.

CASE STUDY: FINLAND

This section offers a brief overview of the present state of affairs regarding game preservation policies and practices in Finland. For a small nation (population of 5.5 million) and a country that not so long ago was still considered semi-peripheral (see Wallerstein 1974), Finland has not only a strong presence in game history, but also a very advanced and progressive heritagization process. Finnish game history has been dealt with in numerous popular histories, but also in various academic works published mainly in Finnish and English (for a more in-depth presentation of the history of historical digital game research in Finland, see: Suominen 2019). For the purpose of this overview, we have shortlisted hobbyist and professional game preservation stakeholders involved in the heritage work of safeguarding Finnish game history: Finnish Museum of Games (public), Kasettilamerit (private), National Library of Finland (public), Pelikonepeijoonit (private) and Wikimedia Finland (NGO). The existing collaboration between these institutions enables know-how transfer and a synergy that is rarely visible in other countries. Furthermore, these institutions and initiatives are partnering with industry (e.g. Neogames, a national association supporting the Finnish game cluster) and academic (e.g. University of Turku) actors. All of these stakeholders are collaborating using the platform of the semi-formal Finnish Roundtable for Game Preservation, which has met ten times between 2015 and 2019. The main strategic goal of the roundtable is to divide preservation responsibilities

between various partners to best suit their abilities. As we do not have enough space to discuss all of the actions of these institutions in this paper, we will focus only on the FMG.

FMG is part of the Vapriikki Museum Centre in Tampere, which itself is a good example of a holistic and sustainable vision because it includes sections related to nature, national history, sports, and more, as well as uses an offsite joint storage facility. Yet the centre is still developing an official sustainability policy. FMG was partially funded by a crowdfunding campaign (for a detailed study, see: Suominen et al. 2018) which has proven that various heritage actors and stakeholders were involved in the heritagization process of video games in Finland. Although aimed at wide audiences, the FMG did not fall into the trap of nostalgia tourism. It attracts young as well as senior visitors, offering a transgenerational experience that has proved to be a popular family-friendly attraction. Drawing on the works of Swarbrooke (2000), as well as Davies and Wilkinson (2008), Stylianou-Lambert et al. (2014, 571) makes an important observation that "cultural tourism and tourism-oriented experiences might limit the social, local role of museums". This is especially visible in museums based in typical touristic locations. Yet in the time of the push for commercial validity of public endeavours it is not uncommon for museums, or other memory institutions of various profiles, to engage with video games just to get public attention. This can be seen in the case of the travelling Game On exhibition, originally developed by the Barbican Centre in London in 2002, and later shown in many other countries worldwide. It is easy for various memory institutions involved in video game preservation to jump onto the train of nostalgia tourism: there is, after all, a cultural trend of reminiscing on the 1980s and the "classic video games" of that era. This is not to say that the museums shouldn't engage with this era, but the example of the FMG shows it can be done also with other priorities in mind (e.g. developing collaboration with the local heritage community).

At the moment, FMG is not involved in the systematic long-term preservation of games, as the institution is still lacking the know-how, resources, and an approved strategy on how to proceed. Selected games from the FMG collections that were originally stored on magnetic media (cassette tapes) were digitized in accordance with the Software Preservation Society standards and made available on the Siiri platform (city of Tampere digital repository). The games selected for digitization were meant to be on display and were thus susceptible to data loss caused by magnetic fields generated by mobile devices. FMG estimates the total number of digitized material at less than 1GB (approximately 100 cassettes and floppy disks), which would represent a very small percentage of the joint digital collections of the Tampere museums, which include hundreds of thousands of high-quality digitized photographs.

FMG is also involved in other digital preservation projects, such as the digital ethnography of the BatMUD community (conducted by Heikki Jungman) or oral histories of Finnish game industry (50+ interviews). Interestingly enough, these contemporary research and memory projects are the biggest challenge regarding storage size, not video games themselves. That is partially because the games that are stored in the FMG digital archives were developed in formats that are not very data heavy from today's perspective.[5]

In brief, the FMG digitizing efforts are focused on the sustainability of a permanent exhibition focused on the history of Finnish digital games. Aside from that, the FMG is slowly building collections of tangible materials on local games and gaming cultures based mostly on incoming donations. Even though the hobbyist initiatives have many advantages over traditional memory institutions, since they are able to react much quicker and often preserve not yet authorized heritage that otherwise might be lost,

these communities are not best for implementing long-term strategies. For example, there is a sentiment within the retrogaming community that we are able to preserve everything, at least in regard of born-digital materials, thanks to new storage technologies. Yet the long-term environmental cost of this specific preservation strategy is not often taken into account.

In the future, FMG will be refining its policies regarding environmental impact as part of a centralized effort by the Vapriikki Museum Center in Tampere, but we hope that the future policies will involve a broader approach to discussed issues and promote a culture of sustainability. So far, according to a study by Suominen et al. (2018), the FMG crowdfunding campaign has proven to be successful because it incorporated a complementary set of credibilities, namely those of curator, collector and player. Collaboration with various communities involved in the game heritage process seems to be the right path to achieve cultural sustainability.

CONCLUSION

In this paper we have argued that, from a theoretical point of view, culture is not a missing pillar in the division of sustainability types, but rather a root concept that enables various aspects of sustainability. Therefore, we prefer not to talk about cultural sustainability but rather a *culture of sustainability* which eventually might lead to sustainable culture. With the latter we refer to a situation where sustainable practices and structures are ubiquitous and do not need constant articulation and justification. Another issue we would like to raise is that in the contemporary discourses on sustainability, the emphasis is – slowly but inevitably – *shifting towards resilience* as a next step. In fact, according to some researchers, due to the escalating climate crisis we might, as a civilization, already be in need of solutions that promote resilience rather than sustainability (Folke et al. 2010).

For the purpose of this study, we have made an attempt to recognize special issues related to the cultural sustainability of game preservation and digital game memory institutions. One of the main challenges is the double presence of games and game-related objects as digital and non-digital artefacts. The other is the fact that digital game heritage is an emerging heritage, and in fact one of many types of new heritage related to new media and computational technologies. The unique situation has led to many advantages and disadvantages: many different actors are interested in digital game heritage and support, the ideas of preservation, and the making of museum exhibitions, collections and various game heritage related activities, but on the other hand, there are no fixed conventions for how and what to preserve and where.

This paper is only a preliminary exploration of a topic that needs a considerable amount of future research, yet we hope the paper will help to facilitate a more focused discussion on questions of sustainability in regard to the preservation of video games, and maybe even digital media in general. However, we would like to stress once more that as a part of this discussion we have to consider a scenario in which by the time relevant institutions manage to introduce policies and practices that enable a broadly understood culture of sustainability, we might have to already think about embracing a culture of resilience. In the discussions on resilience, be it cultural or ecological, we often turn to the knowledge and experience of indigenous communities, as these are often the societies that have endured the most. Nichole June Maher, a Native American activist from the Tlingit tribe of South Alaska, makes the interesting observation that the discourse around environmental sustainability frequently focuses on the negative impact of human civilization and what we are doing wrong. The debate around cultural sustainability could focus on the positive impact of human heritage, but Maher notes that what is often missing is discussion of what we can "carry forward" (Maher and Hall 2007, 2). In our view, the debate on culture of sustainability provokes the question

of not only *what* but also *how* we should "carry forward" our ludic heritage into the future.

ENDNOTES

1 For an up-to-date overview of such titles, it is worth visiting https://games4sustainability.org/.

2 Named after the Norwegian politician Gro Harlem Brundtland, the Chair of the WCED Commission (1983–88) and the first female Prime Minister of Norway (1981).

3 There is a nostalgic tone in this "*sustalgic*" pursuit for the lost part of the sustainability processes and the intention of restoring the machine or working mechanism of sustainable development.

4 Prior to 2014, the *E.T.* landfill was a prominent urban legend that was often referenced in American popular culture. It inspired even a feature movie *Angry Video Game Nerd: The Movie* (dir. Kevin Finn and James Rolfe, 2014) that was entirely crowdfunded.

5 By far the biggest donation is from the game *P.O.L.L.E.N.* (Mindfield Games 2016) and includes over 5GBs of material provided by the main designer Jaakko Kemppainen.

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