GAMIFICATION IN TRANSPORT SERVICES AND THE DIGITAL DIVIDE

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Abstract. *As far as an increasing number of scientists are warning us about the destructive potential of climate change, humanity is facing a tremendous technological revolution. Also, the potential of new technologies to decrease the carbon footprint is significant, but the transition is highly dependent on people's choices and behaviour. This is why, a new way of motivating people around the world emerged: gamification. But, as good and innovative this idea seems to be, as many concerns it rises. Because the focus is mainly on technology, in this paper I will analyse the process of gamification through the lens of the digital divide. The concept was first used in the 1990s to describe the social and economic gap that emerged between those who had access to Information and Communication Technologies (ICT) and those who did not. Today it is mainly focused on the possibility that people would become even more marginalized due to the lack of basic skills and the impossibility to afford the new technologies on the market. Consequently, my research question is: "Is it possible that the introduction of gamification in the field of transportation increases the digital divide?". I will try to answer this question by analysing what categories of people are targeted by gamification in transportation services and which are those that could be excluded. Also, my approach is not limited to a specific country or global area, but is considering gamification and digital divide at an international level.*

1. INTRODUCTION

Earth's climate is changing and this fact is more visible each day, as we face massive forest fires, heatwaves and floods. Scientists predicted that global temperature is likely to exceed 2°C above pre-industrial levels by 2060, and to reach 5°C more at the end of the century. Such a major change will have an irreversible impact on nature, threatening the existence of life itself. In a race against the clock, many countries, or local authorities adopted different policies to deal with this phenomenon. One of the most important pillars of the fight against climate change is the reduction of CO2 emissions by revolutionizing transportation. Using new technologies such as electric cars, Artificial Intelligence, Internet of Things or the 5G network, government, municipalities or private companies came up with various strategies that involve a gamification of the services they provide. Gamification is a way of introducing elements from a game play into an interactive system that involves competition, social activity and rewards. It is expected to change people's

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behaviour in fields such as health, physical activity, education, transportation or marketing.

Regarding transportation, the emerging technologies that are starting to shape the way people understand mobility at a global level are: electric vehicles, Artificial Intelligence and Big Data for traffic management, and an impressive number of mobile apps that facilitate car sharing, use of public transport or other alternative transport facilities. Gamification in the mobility-related contexts is a way of motivating people to use various mobile apps and other technologies that are environment friendly, and to promote a more rational use of vehicles with a thermal engine. But generally, new technologies do not equally impact global societies. To explain this phenomenon, the concept of digital divide emerged. In this article, I will try to see if this concept applies for software or other devices that use gamification as a motivation tool, and, if so, to understand who are the excluded people.

2.   WHAT IS GAMIFICATION?

In the last decade, the online market faced an exponential growth as the usage of internet and mobile devices largely spread in the global society. The diversity of social media platforms and other daily applications created a tough competition and many companies are struggling to have their software products installed on the user's devices. As this struggle took many faces, one of the working questions for most of the software companies was "how to better engage users?" and not necessarily "what new feature to add". As a result, a "new paradigm to engage people, gamification, has been adopted as a strategy for influencing and motivating people to participate in education, training, marketing, networking, and health-related activities" (Suh, Wagner, Liu, 2016: 1).

Gamification basically refers to the incorporation of game elements into different systems to better engage users, and various definitions were developed by scholars in order to offer a more accurate approach, as I indicate in Table 1.

Table 1

(Brigham, 2015: 473)	"Gamification is often used to advance goals outside the context of a game, such as the goals of greener or healthier living. Unlike a game, gamification is not a self-contained unit; it does not have a clear beginning, middle and end. Gamification uses game-based elements and strategies to increase engagement, motivation, learning, and even solve problems".
(Suh, Wagner, Liu, 2016: 1).	Gamification, "refers to the use of game elements, such as design techniques, thinking, and mechanics to enhance non-game contexts to engage users by increasing the hedonic value of an existing information system".
(Seaborn, Fels, 2015: 14)	Gamification "is used to describe those features of an interactive system that aim to motivate and engage end-users through the use of game elements and mechanics".

As Table 1 emphasises, there is no academic consensus on a standard definition for gamification, but there are some common elements that ca be extracted, like user's engagement and game elements. Ayoung Suh, Christian Wagner and Lili Liu came up with an example to clarify these aspects: "Nike+, for instance, has adopted game design elements in such a way that users are rewarded when they reach milestones in their progress toward physical fitness. Users can experience game-like dynamics to earn rewards (e.g., points and badges), track their performance, set goals, join challenges, and

compete with others in the community" (Suh, Wagner, Liu, 2016: 1). In this way, the company successfully built a fan community of 28 million users.

Gamification is in fact a computer-mediated phenomenon that should not be confused with other related game concepts as gaming, game-theory, serious games, applied games, simulation or gameful design. "The difference between these concepts are most obvious when provided with examples. Playing board games or video games within the library is much different than adding gaming elements to a library orientation scavenger hunt" (Brigham, 2015: 473). Best way to separate gamification from other concepts is to keep in mind that it uses a game approach in non-game situations. If gamification is properly implemented, it can provide to users a sense of accomplishment and progress. Also, "by providing the user with the opportunity to fail, they can experiment and explore various ways of showing progress. In most cases, gamification will show the individual's progress, which can motivate them to finish that task or course. In these ways, gamification provides a thoughtful way of laying out what people have achieved, allows them the freedom to fail, and helps them focus on achieving a personal best" (Brigham, 2015: 474).

Regarding gamification typology, Jamie Woodcock and Mark R. Johnson propose a distinction based on a model adapted from an analysis tool of the socialist countries. They borrow the concepts of Socialism-from-above and Socialism-from-below, and adapt it to the gamification process as it follows: "Gamification-from-above is the imposition of systems of regulation, surveillance and standardization upon aspects of everyday life, through forms of interaction and feedback drawn from games (ludus) but severed from their original playful (paidia) contexts. By contrast, gamification-from-below represents a true gamification of everyday life through the subversion, corruption and mockery-making of activities considered 'serious'" (Woodcock, Johnson, 2017: 2). So, the first type is more related to different kind of projects designed by private companies or by a state, while gamification-from-below is more related to a natural process of gamifying daily activities.

Furthermore, Brian Burke, in his book "Gamify: how gamification motivates people to do extraordinary things", identifies the following features as being the most relevant for the concept of gamification:

- Motivation: gamification is a way to motivate people to do mundane tasks by challenging them and showing them the progress that they have made. Thereby, "gamification is about engaging people on an emotional level and motivating them to achieve their goals" (Burke, 2014: Chapter 1).

- Give meaning to players: gamification engages people through ways that are meaningful for the users. "The primary distinction between gamification and traditional incentive and rewards programs is that gamification engages people in a way that is meaningful to them" (Burke, 2014: Chapter 2).

- Changing behaviour one step at a time: most of people's actions are guided by habits, and it is quite difficult for them to change their routine on purpose. Gamification can help a lot by challenging people to change every day (Burke, 2014: Chapter 3).

- Using gamification to develop skills: "Whether it is formal education, corporate training, or informal learning, gamification can provide the path and add motivation to learning activities" (Burke, 2014: Chapter 4).

- Using gamification to drive innovation: gamification can encourage the crowd to innovate weather they are employees, customers or other kind of community. "Gamified innovation solutions provide players with the play space and create the

objectives, rules, rewards, and other aspects of the player engagement model, but they don't define the outcome—players are free to innovate within that space" (Burke, 2014: Chapter 5).

But there is also a critical perspective on gamification. Jane McGonigal has analysed gaming communities and found out that, for them, "the real world just doesn't offer up as easily the carefully designed pleasures, the thrilling challenges, and the powerful social bonding afforded by virtual environments" (McGonigal, 2011: 3). Besides this, reality does not properly motivate them, does not push them to achieve their full potential and does not make them happy. Therefore, the general perception of the gaming communities was that "reality, compared to games, is broken" (McGonigal, 2011: 3). All of these findings were further developed by Mathias Fuchs, who states that "gamification is used to tell people that if reality is not satisfactory, then at least play might be so" (Fuchs, 2014: 146). Also, he proposes to conceive gamification as a new form of ideology, as it provides to people a false consciousness, as Marx and Engels defined an ideology.

3.   GAMIFICATION IN MOBILITY-RELATED CONTEXTS

After I presented the main definitions and features of gamification, I will discuss, in this chapter, the particular case of applying gamification in any mobility-related contexts, in order to approach the research question's objective. The industrialization of agriculture and the massive growth of urban population at the international level are generating serious environmental issues. "Today's cities consume more than two-thirds of the world's energy and account for more than 70 per cent of global greenhouse gas emissions. Low-density urban areas tend to consume more than high-density areas" (United Nations, 2015: 3). This is why, due to the environmental reasons (cities face high level of pollution) and time spent in traffic, the concept of smart city emerged. "In a smart city, efforts to reduce energy consumption are focused not only on supporting the development of smart grid systems or prosumers, but also on reducing traffic. Additional benefits include saving costs and time, environmentally friendly transport, carbon emissions reduction, and fuel consumption reduction" (Olszewski, Pałka, Turek, 2018: 1).

But transportation systems in the large urban areas are complex sociotechnical structures, where various actors are making individual decisions (Marcuccia, Gatta, Le Pira, 2018: 119), and to change the collective behaviour requires a lot of attention and resources to be spent. However, "in the field of mobility a growing number of attempts for motivating behavioural changes using game elements such as incentives or rewards are emerging" (Millonig, Wunsch, Stibe, Seer, Dai, Schechtner, Chin, 2016: 34). Thus, gamification emerges as a promising tool that can change the mass behaviour through innovative transportation solutions. "However, it is not capable per se to induce behavior change. One should rather appropriately conceive, deploy and manage it to maximize users' involvement. In fact, it can produce different results depending on the correlation existing between: structure adopted, context, player-types and their preferences" (Marcuccia, Gatta, Le Pira, 2018: 119).

Relevant examples in the field of transport gamification are bike commuting programmes, such as Austrian cycling campaign "Bike to Work", where game elements were introduced, in order to increase bike transportation in big cities. These programmes, "use elements like competition, lotteries, team experience or awards, adding an emotional quality to the more objective arguments for biking, such as health benefits, time saving or climate change mitigation" (Millonig, Wunsch, Stibe, Seer, Dai, Schechtner, Chin, 2016: 34-35). What scholars found out after they were analysing these programmes was that the

prize was not the main motivating element, but the virtual competition between several teams of bikers (Millonig, Wunsch, Stibe, Seer, Dai, Schechtner, Chin, 2016: 34-35). Another example is the carpooling system that solved, according to Robert Olszewski, Piotr Pałka and Agnieszka Turek, the traffic problem in the capital of Poland, in an area called "Mordor of Warsaw". "Carpooling is a system through which users with similar routes can use one car. Its main goal is to match people who commute to work; therefore, carpooling can be an effective method of alleviating traffic jams during rush hours" (Olszewski, Pałka, Turek, 2018: 2).

To conclude this chapter, the gamification used in mobility-related contexts is a gamification-from-above because there is no natural phenomenon, but a set of rules enforced mainly through software and digital devices. Furthermore, this type of gamification acknowledges most of the features identified by Brian Burke: it is trying to change collective behaviour, give meaning to the users by developing an environment issue and motivate them through different means as team competition. But also, the critique of Jane McGonigal is still available for this case. Reality is broken as we deal daily with overcrowding and pollution, and different game-based systems keep people motivated to go on, as they carry a doubtful perspective as to the solving of these issues in the near future.

4. VARIOUS ASPECTS OF THE DIGITAL DIVIDE

After I pointed what gamification and gamification in the mobility-related contexts entail, it is time to tackle the research question, and what is the digital divide. I will also address how this could be related to the gamification concept. The digital divide is not a new idea, but a quite common concept during the past three decades. The spread of ICT technology was welcomed with a lot of optimism at the beginning of the 1990s, but Kieron O'Hara and David Stevens observed that this feeling did not last long. "If there is a revolution underway, then it is controlled by a small minority of well-placed people, even if it affects us all. Initial hopes that the invention of the PC or the Internet would lead to a more equal or democratised society quickly faded" (O'Hara, Stevens, 2006: 69-70). As time was passing, an increasing number of researchers discovered that more inequality arises from this new type of economy built around computers.

As I already mentioned, "in the second half of the 1990s the attention for the subject of unequal access to and use of the new media started to focus on the concept of the so-called digital divide. Before that time more general concepts were used such as information inequality, information gap or knowledge gap and computer or media literacy" (van Dijk, 2006: 221). Consequently, the concept of digital divide was first coined in the middle of 1990s by the US Department of Commerce's National Telecommunications and Information Administration. Since then, it was broadly adopted by the scientific community and it became the subject of different meanings and definitions. Pål André Aarsand considers that the digital divide is in fact the difference between "those who know and those who do not know how to act in a digital environment" (Aarsand, 2007: 236) and, also, between "people who had access to, compared to those who did not have access to computers and the internet" (Aarsand, 2007: 236). Also, Jan van Dijk used a broader definition, referring to technology in general: "The digital divide commonly refers to the gap between those who do and those who do not have access to new forms of information technology" (van Dijk, 2006: 221-222).

There were many factors connected to the creation of the digital divide, but the most important one was considered to be rooted in the educational system. "The task given to the

educational system rests on the ideas that differences in children's digital literacy are a result of activities that take place outside school, and that such differences constitute a problem" (Aarsand, 2007: 236-237). Thus, the school should be the place where children would acquire their main digital skills. This could give them equal opportunities in their future careers and reduce, in time, the gaps generated by the digital divide.

Education is an important element that can generate digital divide but, however, it is not the only one. Jan van Dijk imagined an entire model that indicate how digital gaps are formed and deepened, as one can see in Figure 1.

Figure 1
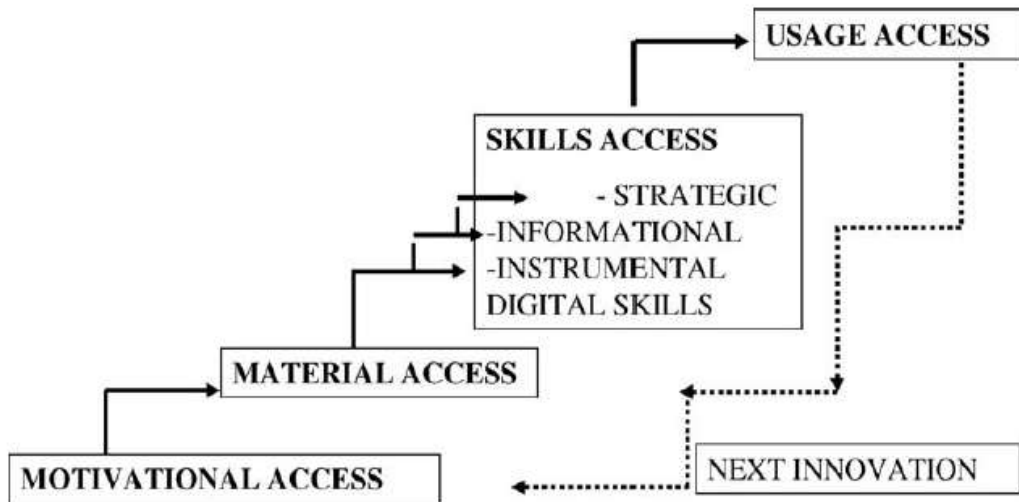
(van Dijkm, 2006: 226)

According to this model, everything starts with motivation. "Prior to physical access comes the wish to have a computer and to be connected to Internet. Many of those who remain at the 'wrong' side of the digital divide have motivational problems" (van Dijk, 2006: 226). The motivational issues often emerge from no need of using digital devices in the daily life or career, lack of money, lack of time or lack of skills. But if someone acquires the necessary motivation and manages to have permanent or temporary material access to ICT infrastructure, then the problem of skills might interfere. "This problem is framed with terms such as 'computer, information or multimedia literacy' and 'computer skills' or 'information capital'" (van Dijk, 2006: 226). Here, as I already discussed, institutions and self-education play a decisive role. Then, "actual usage of digital media is the final stage and ultimate goal of the total process of appropriation of technology that is called access in this article. Having sufficient motivation, physical access and skills to apply digital media are necessary but not sufficient conditions of actual use" (van Dijk, 2006: 229). For proper usage, one would need sufficient time to spend, a good internet connection, or to apply the knowledge on real-life situations.

A mid-term conclusion after I discussed all these theoretical aspects is that elements like skills, affordability or motivation to use digital devices are not directly related to the gamification concept, but more to the devices and programmes that use gamification. For example, in the case of a smart city, "most vulnerable populations – its elderly, minorities and poor – are most likely to be left out" (Bordal, 2016). In this context, applying gamification for devices or software that some parts of the urban

population are barely using, could lead to an increase of the digital divide. I call this, the first wave of the digital divide.

To determine if there is a second wave of digital divide, which I consider to be directly related to the gamification process, a broader analysis on inter-generational digital divide should be done. Don Tapscott considers that "today, instead of a gap, there is a "generation lap"—kids are outpacing and overtaking adults on the technology track, "lapping" them in many areas of daily life" (Tapscott, 2009: 28). But the rift Tapscott observed between kids and their parents regarding technology is not just a matter of certain accumulated skills while playing child video games. The technology itself seems to determine the way children think: "the brain is particularly adaptable to outside influences in the first three years of life and then during teenage and early adult years, which is just when most Net Geners are immersing themselves in interactive digital technology 20 to 30 hours per week" (Tapscott, 2009: 98).

Another important contribution belongs to Marc Prensky who wrote a chapter, "Digital Natives, Digital Immigrants", in a book coordinated by Mark Bauerlein and called "The Digital Divide". His argument is that the present educational system is outdated due to the digital gap between teachers or decision makers and children. He states that "today's average college grads have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games (not to mention 20,000 hours watching TV). Computer games, e-mail, the Internet, cell phones and instant messaging are integral parts of their lives" (Prensky, 2011: 4). These kids are digital natives, which means that they can natively speak the language of computers, video games and the Internet's. The main characteristics of the digital natives are:
- They better handle multitasking processes;
- They prefer to learn from graphics/pictures/videos, rather than from text;
- They work better in networks;
- For motivation, they need frequent rewards;
- They prefer to play games rather than to focus on work (Prensky, 2011: 5-6).

To conclude this chapter, there are two approaches regarding gamification and the digital divide, which I called the first and the second wave. The first wave is related to the lack of access or the lack of skills to handle devices or software that might contain game elements. The second wave is directly linked to gamification and imply, according to Tapscott, an inter-generational gap. Furthermore, Marc Prensky describes the generations that grew up with computers, internet and video-games as having a different mindset by preferring games to focus on work and being motivated with frequent rewords. In the next chapter I will try to outline which are these generations that Tapscott and Prensky are describing in their research.

5. MILLENNIALS AND GEN Z – THE LIMITS OF GAMIFICATION

Although the concept of gamification is relatively new, games have been part of human culture since the beginning. "Games are firmly entrenched in human culture, continuing to influence our social and leisure lives on a scale unprecedented and yet historically anticipated" (Seaborn, Fels, 2015: 14). But due to the spread of personal computers, video-game industry has expanded in a manner that succeeds to cover a wide range of sport competitions, stories or daily activities in order to determine the users to feel more comfortable in the virtual world. This is why, as I argued, "the greatest attraction of applying gamification to an activity or a course is that it encourages increased involvement and engagement" (Brigham, 2015: 474). But now, the question is who are

those people shaped by the video games? For a clear image of an inter-generational digital divide that might be outlined, I will propose the following classification.

Figure 2

(Corey, 2018)
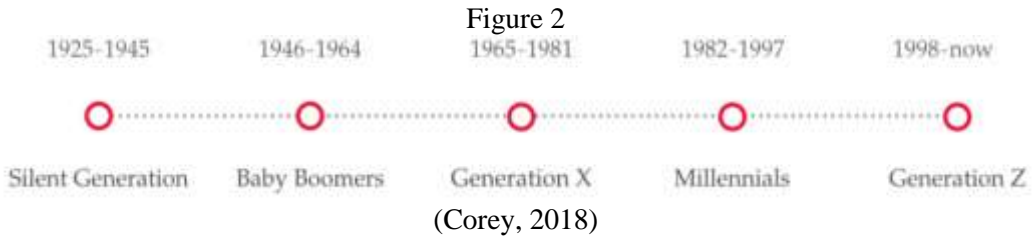
According to the time table proposed by the Figure 2 and with the fact that video-games massively spread in the 1990s along with personal computers, Millennials and Generations Z are those who grew up or still growing up with games as a part of their lives.

As Tara Brigham states, "millennials are the first generation that did not have to adapt to new technologies of the digital era—the Internet, mobile technology, and social media to name a few. Unsurprisingly, millennials are technologically savvy and avid users of a variety of digital platforms" (Brigham, 2015: 471-472). If the PC games were the beginning, the spread of smartphones opened new and unexplored territories. "Although video games have been around since the 1970s and have steadily increased in popularity, the influx of smartphones and mobile devices in the last five years has taken the reach and usage of technology-based games to a new level" (Brigham, 2015: 471-472). This is why Millennials and Gen Z are more dependent on game elements in order to properly work and live, comparing with the previous generations. Moreover, Adam Porter confirms that the Millennials grew up in a world of computers and video games, but he states that "these games may have negative effects on people (or not – the debate continues to rage), but all games involve problem-solving, critical thinking, and strategy" (Porter, 2008: 232). Even more, games also involve a strong competitive and teamworking component, as we have various successful and largely spread MMOG (Massively multiplayer online games). Thus, gamification process embeds elements such us developing strategies, creating competitions and teamwork in order to boost the involvement of millennials and to have them as an active component.

The analysis of Austin Corey shows that "58 percent of Millennials have played video games in the past 30 days, and one-fifth of those players spent more than 20 hours gaming during that time (roughly five hours a week). They are 25 percent more likely than Gen X to play regularly" (Corey, 2018). Also, 77% of students declare themselves gamers, while 60% of women are playing computer or online games, and 40% of men (Porter, 2008: 232).

According to Liliia Matraeva, Ekaterina Vasiutina, Alexey Belyak, Petr Solodukha, Nataliya Bondarchuk and Marina Efimova each generation has developed different cultural background due to the historical events and specific condition that they grew up with, as it follows:

- Generation GI (the Generation of Winners - 1900-1922) - revolutionary events of 1905 and 1917;

- Silent Generation (1923-1942) - repression, World War II, the restoration of a destroyed country;

- Generation of baby boomers or boomers (1943-1962) - the Soviet "thaw", the USSR – is the world superpower, the "cold war", the unified standards of education in schools and the guarantee of medical care, the generation with the psychology of the winners;

- Generation X (Unknown Generation 1963-1982) - the continuation of the Cold War, Perestroika, AIDS, drugs, the war in Afghanistan;

- Generation Y ("Network generation", the generation of "Millennium" 1983-2002) - the disintegration of the USSR, terrorist attacks, military conflicts, outbreaks of epidemics, economic crises, the development of digital technologies, the era of status items;

- Generation Z (2003-2023) - digital revolution and economy, instant accessibility to information and accumulated knowledge, gamification (Matraeva, et all., 2019: 126).

As this classification shows, Millennials and Gen Z base their development on digital technologies, while Gen Z are heavy related to the gamification process. Following this perspective, addiction to video-games should be even stronger for the Gen Z. Now, 68% of Gen-Z males are saying that gaming is an important part of their personal identity (Whistle, 2018). This indicates an important difference in the way these two generations are valuing video-games. For Millennials is more about free time and leisure, while for Gen Z, it started to be a way of living the social life. "There's a consensus that Gen Z is lonely, but that could be a misinterpretation of the reality. Instead, it's possible that social interactions have evolved into ways that aren't considered social at first. Connecting online and through video games is a different type of connecting, but it's the type that Generation Z has grown up with" (Wallace, 2019).

Even if technology unites both generations, it is also important to observe what kind of technology they grew up with. "Millennials grew up using DVD players, giant personal computers, cell phones with tiny screens, and dial-up internet. At that time, we thought these technologies were groundbreaking. Now, most children and teens within Gen Z have access to iPads, smartphones, endless Wi-Fi, or streaming services that put our prized DVD players to shame. Many members of this generation might have also grown up in households with early smart home technology" (Bump, 2019). Thereby, Millennials experienced the gradual development of ICT, while Gen Z were able to use it since day one.

To conclude, from Gen X to Gen Z, as technology evolved, video-games had an increasing impact on their lives. For my analysis, as video-games started to spread in the '70s, Gen X was not as relevant in discussing gamification as Millennial and Gen Z. The former two generations grew up with video games, and a gamification of various aspects of "real life" might appear to them as sign of normality.

6. CONCLUSIONS

In this paper I attempted to demonstrate the possibility of increasing the digital divide posed by gamification in the field of transportation at the international level. In order to do this, I first discussed the concept of gamification, highlighting different theoretical perspectives. As a general approach, gamification is a process where elements from video-games such as design techniques, thinking, and mechanisms used in totally different contexts, in order to increase the motivation of users, to give them a meaning, to change their behaviour or to support the development of new skills. Then, I showed that in

the mobility-related contexts, gamification can be a useful tool to change the transport routine, especially in big cities as part of smart cities programmes.

Furthermore, I tackled the concept of digital divide and I show that, initially, it reflected the gap between people who have and people who do not have access to digital instruments such as computers or Internet. People who are excluded from the usage of these technologies are, implicitly, excluded from the interaction with gamification processes. I called this the first wave of digital divide. But the further question was: are there any people that might be excluded by gamification itself? At this point, I discussed the researches of Prensky and Tapscott that were pointing a significant difference between generations, in regards to video-game perception.

To answer the research question, the introduction of gamification in the field of transportation could increase the digital divide between people belonging to different generations. The most adapted generation to the gaming elements is Gen Z, which perceive games as part of its personal identity. Millennials constitute the generation that has matured in the same time as the spread of personal computers and Internet, and for them, video-games are more related with free time and leisure activities. Then, if Gen X is weakly related to video-games, as they lived in a time when this new type of human activity was just starting to spread, the other generations are mainly excluded. Thus, these differences are producing in fact the inter-generational digital divide.

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