Seeing through Black Mirror: Future Society and Architecture

M. Galieh Gunagama[1]

[1] Department of Architecture, Universitas Islam Indonesia, Yogyakarta

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Abstract

Black Mirror is a series of sci-fi anthology that since it first aired in 2011, has been widely discussed because of its depiction of issues on futuristic technology and its prediction about the future society. Architecture, as a form of social expression, cannot be separated from the community that existed at a time. Through the scenario in Black Mirror, the future of architecture is discussed in this paper.

This paper uses analysis of future scenarios as a basis for formulating possible community conditions. The discussion in this paper includes the state of technology and society in the future described in the series, the forms of future scenarios in its narrative, and technology that affects architectural design in the future.

The issues in the Black Mirror include human impulse, sensory perception, automation, memory, and cognition. The architectural design in the future depends heavily on how humans and society behave towards technological sophistication that might occur. The diminishing physical sensation will have a significant impact on how the design is formulated.

Keywords: *black mirror, future of architecture, scenario analysis, technology*

Introduction

The future holds many things that humans cannot understand. However, it does not mean that humans cannot predict trends that occur based on past data and experience. Similar discussions have been carried out by futurists in the past to predict the present, some of which come true, while others do not. Meanwhile, today's futurists are taking the lead in predicting what will happen in the future.

This is the central premise raised in Black Mirror (abbreviated: BM). This TV series is an anthology released in the UK that first aired on Channel 4 in 2011 (IMDb, 2018). This science fiction show tries to describe how people in the future behave with technological developments.

BM was chosen in this study because through the anthology format; this series appeared with different narratives in each episode. The concept is not the same as other serials in general, where each episode is a continuation of the previous story; each story in BM stands alone and delivers its narrative independently so that each episode can be used to explore new ideas and develop them into discourses and discussions outside the format of the story itself.

Although different, in every BM episode, there is at least one theme that is always in focus. The themes range from criticism of the social condition in the context of the future presented in the form of hypothetical technology that can provoke questions and discussions ranges from digital technology and mass media (Murray, 2013; Phillips, 2017); the complexity of humanity (Vandermeer, 2016); the cultural representation of state control (Huber, 2017); the dystopian future (Radovanović, 2018); gender norms in digital age (Cirucci, 2018); to politics (Conley & Burroughs, 2019). After watching the narrative presented, there is a sense of curiosity that viewers are left with

Correspondence: M. Galieh Gunagama
Department of Architecture, Universitas Islam Indonesia, Yogyakarta
E-mail: galieh.gunagama@uii.ac.id

at the end of the story, which encourages speculation about the influence of technology on the broader human life in the universe of the episode.

Discussion of developing technology does not stop at social matters, and in fact is very likely to be put in the realm of architecture. This is because architecture is an integral part of the social conditions of the people. This paper aims to look deeper into how the premise patterns of technology displayed in BM and discuss their impacts in architecture. The discussion focuses on the scenario of the conditions that appear on BM and brings implications that might arise from these conditions to architecture. The narrative background in each episode will be used to predict alternative architectural scenarios that may occur in the context of the environment.

This paper is determined to answer several questions, i.e. How does BM depict the condition of technology and society in the future? What are the forms of future scenarios in the BM narratives? How do technology scenarios in BM affect architectural design in the future?

Literature Review

Architecture, as an expression of culture, is inseparable from the social conditions of the community at the time. The social construction of a society is reflected in the form of inherited buildings, in which some can survive in the changing times, while others do not. Humans make a place where they do things in their lives (Unwin, 2003). The way humans regulate these places relates to their beliefs, ideals, and views on the world around them. Because views of the world vary, the architectures vary as well, from the individual level to the social and cultural levels. There are many examples of culture expressed extensively through architecture ranging from buildings in ancient Egyptian and Greek culture to the modern era (Mondal, 2015).

This ever-changing human outlook is then discussed extensively from a sociological perspective, especially about the role of technology in changing society (Mutekwe, 2012). A change in society is a necessity with technology as the primary catalyst. Examples of changes in society due to technological developments have existed since the beginning of civilization, that is, when the transition from hunting and gathering communities became a feature of farming communities as a result of the emergence of the plow and hoe technology. Something similar happened when the transition of the agricultural community into an industrial society when steam engine technology began to develop. Likewise, at present there is a shift from industry to automation due to the development of digital technology.

Thus, the close relationship between technology and architecture is a necessity. The technological developments at one time influence the architecture at said time. However, to be able to see buildings and architecture in the future that have not yet occurred, it is necessary to develop a framework that can help understand the possible conditions of society and technology at a particular time.

Recognizing a scenario of a community's condition is very important in an experimental discussion. Experimentation in design is needed to re-question current reality and test ideas about future alternatives (Gunagama & Lathifa, 2017). Scenarios are descriptions of situations that may occur in the future or conceptual future, including steps that can lead to the future (Kosow & Gaßner, 2008). Scenarios are not predictions but rather hypotheses that allow us to imagine and prepare a variety of different strategies (The Rockefeller Foundation and Global Business Network, 2010).

Scenarios are used to help individuals and groups to carry out creative processes by identifying potential and strengths that can change the reality of the world; and to expand thinking about opportunities and challenges in the future by exploring through narratives that might alter or strengthen current trends, sometimes in unexpected ways. Scenarios capture various possibilities in the future, in the best and worst conditions, either expected or not, yet still possible. This kind of discussion requires thinking skills outside the status quo, leading to things beyond the recognized limits (The Rockefeller Foundation and Global Business Network, 2010).

Extensively, Kosow and Gaßner (2008) have discussed and compared different scenarios and future analysis methods with all their

advantages and disadvantages. Although there are many models in the discussion of scenario analysis techniques, there are at least five stages in the approach. The first stage is to identify the question and scope of the study. The second stage is about critical factors that influence the future. The third stage is about testing various possible outcomes of the essential factors. The fourth stage relates to finding the essence of the main factors that exist to make different scenarios with the number is more limited, whereas the final stage is to apply the scenario formed in the fourth stage as a basis for strategic assessment (Kosow & Gaßner, 2008). This study uses a similar framework and applies it through the BM narratives.

The purpose of using the scenario analysis method is to create an orientation concerning future developments through several relevant factors. In this regard, there are three things that must be addressed. First, the scenario is not a comprehensive view of reality in the future. Second, time construction is also a significant factor that needs to be considered in looking at the context of its connection with other factors to be studied. However, because its property is only in the form of assumptions and without a complete database, the assessment that arises can only be explorative, normative, subjective, and in the way of a series of possibilities that can occur. Because of this time factor, the third thing to note is the possibility that the final results in the real world can still change with the development of trends and conditions that occur (Kosow & Gaßner, 2008).

This paper seeks to look at various technologies and the developments seen in BM to test ideas about the impacts of technology on the future. After identifying the main patterns of the existing scenario, the paper will discuss how the conditions in the scenario can occur in individuals, society, and their impacts on architecture.

When this paper was written, BM had reached its fifth season and was broadcast through the Netflix network after its broadcast rights were acquired from UK Channel 4 in 2014 (IMDb, 2018). However, the discussion in this paper will only cover the narratives from the first season to the fourth season. In all four seasons, 19 episodes had been broadcast and were well-received by critics around the world.

Charlie Brooker, the creator of BM, said that technology is similar to medicine, and feels like a drug (Brooker, 2011) However, discussions about the side effects of this technology have not been widely discussed and explored. BM tries to show predictions of human dependence on technology with a twist at the end of each episode. The main point the creators want to convey is how a technological context can make human users feel that there is something wrong with it or with themselves, and how they become victims of the incidents they experience. In addition, the narrative in BM is considered to be a criticism of today's society that is highly dependent on technology and the possibilities that can occur on the society's order in the future.

Discussion

a). Technology Categorization in the Black Mirror Narratives

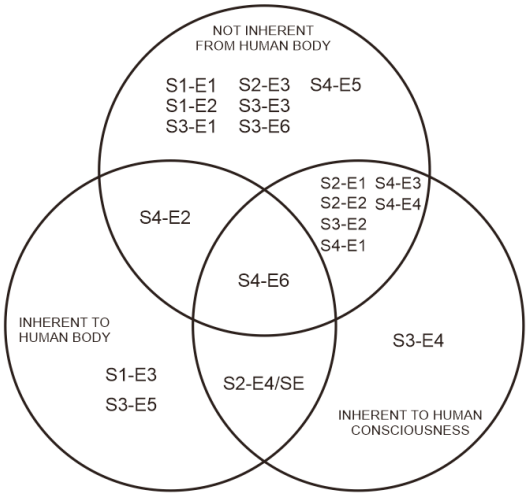
Narratively, there are at least three main groups of technology concepts presented in BM. First, the advanced concept of technology that is not inherent from the human body. In this type, the idea of technology is presented in the form of a sophisticated device that is outside the human body and requires a certain way to use it. In other words, it refers to the type of technology available today.

Secondly, it is the concept of technology that is inherent to the human body. This type of technology is portrayed as a sophisticated tool attached to the human body, which can be used in specific ways and can also work automatically. This concept is often described as a technology that allows a connection into the brain or mind of its users. The third type is the technology inherent to human consciousness. The concept of this technology is displayed as a sophisticated tool that can be connected directly with the mind and consciousness of humans to carry out real-time commands in the brain. In general, the second and third types are displayed in the form of different and new technology with visualizations that are as close as possible to the existing tools.

The first type of technology, for example, can be seen in how television broadcasts and digital mass media platforms that are currently commonplace are exploited by irresponsible

people, such as in *The National Anthem*.[1] The kidnappers broadcast (via media) the kidnapping of the British Royal Family, causing the British PM's protagonist to face a critical choice between his family, political career, and non-conforming public interests.

Figure 1. Technology concept categorization for Black Mirror episodes



The way technology such as social media influences the perceptions of individuals and society is portrayed in *Fifteen Million Merits*[2] and *Nosedive*[3] . In both episodes, the protagonists act because they are driven by values in a society that is very dependent on the other people's assessment of the personal image displayed in digital media. In this kind of society, the needs and images of individuals may be falsehood, or the result of an illusion created by the media itself.

The role of the media today in leading public opinion in all aspects of life is also explored more deeply in *The Waldo Moment*[4]. In this episode, the efforts to exploit the image of political figures and influence the masses to elect their representatives in government are shown as the power of corporate media. However, in an increasingly irrational modern society, as reality becomes very distorted, even imaginary cartoon characters can advance into electoral contestations.

The misuse of technological devices and the mortal dangers they may pose is shown in *Hated in the Nation*[5] , *Shut Up and Dance*[6] and *Metalhead*[7]. The first and second narratives show how technology and individual information can be used to commit criminal acts when they fall into the wrong hands. Of course, with the high anonymity of the digital world, tracking the perpetrators of cybercrime will be very difficult to do, and the potential for untraceability is enormous. In the latter narrative, it is shown how automated technology is designed to act entirely without human assistance so that it can do life-threatening things.

Figure 2. Comparison between conceptual autonomous robot form Metalhead (left) and the real robot "Spot" from Boston Dynamics (right)

The second type of technology is represented through several episodes, such as in *The Entire History of You*[8] and *Men Against Fire*[9]. In the first episode, it was shown how an implant of "grains" technology became a kind of expansion of human memory with its ability to record everything that a person experiences and play it back in the form of video recording. In the second episode, the sophistication of technological implants is shown to increase the combat capability of a military force in the act of eradicating the danger of alien beings in an area.

In the third type, the narrative about technology and human consciousness is portrayed in *San Junipero*[10]. The Whole Brain Emulation (WBE) technology, a kind of process of uploading consciousness, is used to preserve the human mind and consciousness into digital form and

[1] Brooker, C. (Writer); Bathurst, O. (Director), 2011, UK: Channel 4 Television.
[2] Brooker, C. & Huq, K. (Writer); Lyn, E. (Director), 2011, UK: Channel 4 Television.
[3] Brooker, C. (Writer); Wright, J. (Director), 2016, USA: Netflix.
[4] Brooker, C. & Morris, C. (Writer); Higgins, B. (Director), 2013, UK: Channel 4 Television.
[5] Brooker, C. (Writer); Hawes, J. (Director), 2016, USA: Netflix.
[6] Brooker, C. & Bridges, W. (Writer); Watkins, J. (Director), 2016
[7] Brooker, C. (Writer); Slade, D. (Director), 2017, USA: Netflix.
[8] Armstrong, J. (Writer); Welsh, B. (Director), 2011, UK: Channel 4 Television.
[9] Brooker, C. (Writer); Verbruggen, J. (Director), 2016, USA: Netflix.
[10] Brooker, C. (Writer); Harris, O. (Director), 2016, USA: Netflix.

store it eternally in the cyberspace.

Apart from these three types of technology, some episodes display a combination of themes from two or more types of technology. For example, a combination of first and second types of technological concepts is shown in *Arkangel*[11]. In the episode, an implant technology was planted into the brain of a child's character so that the mother's character could monitor the child's development and daily life through a kind of handheld device.

One compelling narrative can be seen in the episode *White Christmas*[12], which presents a combination of the second type of technology concept combined with the third type. It features the concept of blocking features and a kind of censorship in visual implant technology in humans as well as the utilization of WBE awareness copies as personal assistants.

Figure 3. A scene from White Christmas depicting the interaction between real human and the WBE technology

The concept that combines the first and third technology types is also the main point in *Playtest*[13] and *USS Callister*[14]. The concept of digital games that are directly connected to the human mind and prioritize the use of immersive features is nothing new. In the first episode, a trial event and its impact on the player are displayed, while in the latter, it shows how technology can be used to steal human identity in the real world and turn it into a character in a virtual game.
The incorporation of the first and third types of technology appears in several episodes. For example, in *Crocodile*[15], it is displayed in a tool that can be used to see someone's memories and thoughts to testify in a case. Meanwhile, in *Hang the DJ*[16], the concept of technology allows users of online matchmaking software to upload their consciousness so that matching pairs can be found in a digital database. *Be Right Back*[17] presents the narrative of sophistication of pattern learning, a software that can reconstruct one's thoughts and attitudes only from digital footprints on social media, ranging from videos, sound recordings, images, conversations and texts, and other interactions in the virtual world.

In *White Bear*[18], the first and third types of technology are displayed as a tool that can be used to punish criminals. The main point of the story revolves around a technology concept in the form of a memory removal tool used on criminals who live in a correctional facility with the concept of an apocalyptic post-themed amusement park. Finally, in *Black Museum*[19], a combination of all types of technological concepts is displayed. The story set in the museum allows creators to tell some concepts of technology as artifacts on display to visitors. Among them are dolls and souvenirs that contain copies of human consciousness.

b). Future Scenarios in Black Mirror

The narratives in BM show several settings that can be divided hypothetically into five scenarios. Several main issues can be drawn in future scenarios, namely, impulses and motivations, sensory perceptions, automation, memory, and cognition (consciousness). These five things are likely to be the main concerns that BM creators consider to be some of the most important issues that may become problems in the future.
In Scenario I, the central issue is human impulses driven by technology. Dalley (2014) sees the connection between the hive mind and the emergence of technology. Technology

[11] Brooker, C. (Writer); Foster, J. (Director), 2017, USA: Netflix.
[12] Brooker, C. (Writer); Tibbets, C. (Director), 2014, UK: Channel 4 Television.
[13] Brooker, C. (Writer); Trachtenberg, D. (Director), 2016, USA: Netflix.
[14] Brooker, C. & Bridges, W. (Writer); Haynes, T. (Director), 2017, USA: Netflix.
[15] Brooker, C. (Writer); Hillcoat, J. (Director), 2017, USA: Netflix.
[16] Brooker, C. (Writer); Van Patten, T. (Director), 2017), USA: Netflix.
[17] Brooker, C. (Writer); Harris, O. (Director), 2013, UK: Channel 4 Television.
[18] Brooker, C. (Writer); Tibbets, C. (Director), 2013), UK: Channel 4 Television.
[19] Brooker, C. (Writer); McCarthy, C. (Director), 2017, USA: Netflix.

advancement encourages people to act more similarly in a single hive or honeycomb unit. Dalley argues that in the future, humans will increasingly act together coherently. Due to the ease of accessing information without the chain of command, everything can happen unplanned (Dalley, 2014). This can be seen in *The National Anthem, Fifteen Million Merits, Nosedive, The Waldo Moment, Hated in the Nation, and Shut Up and Dance*.

This can be explained through how human nature is to be constantly in dire need of connection with others. Haidt, Seder, & Kesebir (2008) mention at least three hypotheses about attachment between humans that can explain how humans act in a collection. First is The Dyadic Hypothesis, which states that every human needs another human to fulfill and respond to their needs. Secondly, The Moral Community Hypothesis states that a person needs to belong to a community that has the same values and norms to develop. Without bonding to the rules and values of the community, humans cannot achieve satisfaction for themselves (Haidt, Seder, & Kesebir, 2008).

The third is The Hive Hypothesis, which states that self is an obstacle to achieving happiness. Therefore, humans need to merge into social organisms for their development. It is said that the more a person decreases his/her self-awareness and feels he/she can unite with a larger group of people, the more effective the moral values in the community would be (Haidt, Seder, & Kesebir, 2008).

Technology enters into the gap of emptiness in humanity by becoming a liaison between humans — a means for people to merge into a larger community movement. In the BM narratives, the protagonists are always depicted as victims of the conditions who experience some sorts of consequence of their choices in the past. This is further complicated by the value they want to follow in a broader social gathering. Soon, technology will be increasingly influential in moving the masses, and will make it easier to direct the masses to carry out actions desired by a party, with or without thinking of the consequences.

Table 1. Scenarios in Black Mirror and the forms of technology portrayed

Table 1. Scenarios in Black Mirror and the Form of Technology Displayed					
Scenario		List of Episodes	Form of technology	Issues	Time
I	What if there is a technology that can be used to influence people or communities to take specific actions?	S1-E1 S1-E2 S2-E3 S3-E1 S3-E3 S3-E6	TV, sosial media, drones, Computer Generated Imagery (CGI), smartphones, Internet of Thing (IoT)	Human impulses and motivations	A near future
II	What if there is a technology that can interfere with the human senses?	S2-E4/SP S3-E5 S4-E2	Implants, hypothetical technology, IoT, Augmented Reality (AR)	Human sensory perceptions	Not so far future
III	What if there is autonomous technology that can act freely?	S2-E1 S3-E6 S4-E3 S4-E5	Autonomous robotic technology, Artificial Intelligence (AI)	Automation	Not so far future
IV	What if there is a technology that can be used to enter someone's memory?	S1-E3 S2-E2 S4-E2 S4-E3	Implants, hypothetical technology, IoT	Human memory	Not so far future
V	What if there is a technology that can duplicate or simulate someone's consciousness?	S2-E1 S2-E4/SP S3-E2 S3-E4 S4-E1 S4-E4 S4-E6	Implants, Whole Brain Emulation (WBE), hypothetical technology, IoT, AI	Human cognition (conscious-ness).	A distant future

In Scenario II, the main issue is the distortion of human perception caused by technology. The sensation is defined as a direct response from individuals who react directly to different sensory systems, whereas perception is the whole observation, feeling, integration, processing, and interpretation of the stimulus objects that occur in our brain. The sensation of the human senses and perceptions are two things that run simultaneously and are almost impossible to separate from each other (Xin, 2017). When technology is very close to the human senses, its existence can also change an individual's perception of the surrounding reality. A recent study even points out that digital technology especially the internet may be already changing human cognition and brain structures (Firth & et.al., 2019).

The relationship between digital technology and its potential in designs that can provide multi-sensory experiences have been discussed previously. If done carefully, digital technology can be used to enhance sensory stimulation and improve spatial perception (Breffeilh & Azarbayjani, 2015).

This happens allegedly because of the development of the Internet of Things (IoT), which is the most widely displayed forms of technology in BM. The concept of IoT refers to the connection of internet technology with Anyone, Anything, Anytime, Any places, Any

services, and Any Networks (Mohammed & Ahmed, 2017). It can be interpreted that in the future scenario, IoT will go deeper into all aspects of human life.

The issues of IoT were discussed extensively by Mohammed & Ahmed (2017) along with the various challenges they faced, including security and privacy. Another study shows, there are at least three things that become the main concerns in IoT, i.e. confidentiality or the ability to maintain data privacy; authentication or the ability to verify whether a data has not been modified and can be traced back to the original sender; and access, which includes the ability to ensure and allow authorized users to access digital infrastructure (Lin & Bergmann, 2016).

The breadth of scope on IoT applications and the technology that is getting smaller are other things that need to be discussed in regard to the urgency of security and privacy in the future. The smaller size technology also allows the installation of an implant in the human body. This certainly will improve human capabilities in many ways. One of them is by using Augmented Reality (AR).

BM uses this AR premise quite extensively. Some episodes such as *Men Against Fire, Arkangel*, and *White Christmas* make use of implants, AR, and their variations as the central theme, i.e. from improving memory, increasing combat capabilities, and being used for law enforcement purposes. However, without an adequate security system and privacy, security breaches at this stage will have a very massive impact on the individual.

The discussion of technology in Scenario II is very closely related to the technology on the Scenario I, which has been discussed in the previous section. This is because individual perceptions can influence individuals to act. The actions of many individuals who have similar impulse are the things described in the first scenario.

The central issue raised in Scenario III is about technology that can act independently. Bostrom and Yudkowsky (2011) question the ethical issue in developing machines that can think independently or Artificial Intelligence (AI). The discussion is not only to ensure that the machine does not hurt humans, but also about the moral status of a machine. The development of artificial intelligence can lead to the opposition to existing ethical and cultural standards, and add burden to society towards unknown and foreign things, which can lead to social upheaval (Miller, Michalski, & Stevens, 1998).

The main issues of AI development are about responsibility, transparency, the ability to be audited, the ability to not be undermined, and predictability (Bostrom & Yudkowsky, 2011). AI programming must be transparent enough so that decisions made can be traced and if there is a disability, errors can be found in the program. AI needs to be easily predicted for anyone who is authorized to know how the program is executed. AI itself must be resistant to manipulation to avoid mistakes.

Another critical ethical issue expressed by Bostrom and Yudkowski (2011) is the theoretical debate on the moral status of a machine. At this time, it is accepted that humans have moral status, while machines do not. Creatures that are considered to have moral status will rationally be treated in such a way and will not be treated in other ways. As the only beings considered to have moral status, humans develop the values of appropriateness and impropriety.

There are at least two criteria related to moral status, namely sentience and sapience (Bostrom & Yudkowsky, 2011). Sentience is the capacity to experience a phenomenon, such as the ability to feel sick and suffer, whereas Sapience refers to a set of capabilities related to high intelligence, such as self-awareness and being something that is mindful and able to react.

This then becomes a paradox. If humans had succeeded in creating a machine that could experience and possess intelligence, would the moral status owned by humans be attributed to the machine as well? An in-depth discussion of similar ethical issues and their various implications is a subject that many prominent philosophers and futurists discuss. Metzinger (2003) states that it is very unethical to build software that can suffer, while Dvorsky (2014) cites Louie Helm who expressed his objection to the idea of trapping intelligence in a machine

and forcing it to work without stopping, which morally, seems like modern slavery.

The narratives in BM show the same tendency, and many of them convey the anxiety related to autonomous machine scenarios in the future. Episodes associated with this scenario include *Metalhead, Crocodile, Be Right Back*, and *Hated in the Nation*. This Scenario III can be an in-depth discussion in its own right, and it is also very closely related to the Scenario IV and V regarding memory and consciousness, which will be discussed in the next section.

Technologies related to human memories are the central issue in Scenario IV. Shlain predicts that by 2025, everyone will be connected via the Internet. The part of life that will change as a result of this phenomenon is the memory and interaction with new ideas. Humans will have machines that can help them remember facts, memories, and access ideas that will expand the ability of the human mind (Pew Research Center, 2014).

However, there are significant challenges in technology that can directly access the human mind. Mudede (2018) cites Wilkinson, who argues that it is likely that there are specific reasons unknown to humans of why someone's thoughts are not accessible to others. There may be specific fundamental reasons that can affect humanity and the social order behind human's memories, which are formed by emotions and sensations that each person felt. Opening access to the memories is like opening the Pandora's Box, which can cause various negative impacts that were previously unknown to humans.

There are several episodes in the BM which brought up the theme as a basis in the narrative, especially The Entire History of You, Crocodile, White Bear, and Arkangel. The existence of advanced technology that can access human memory to then see other people's memories and or change them becomes quite essential to be discussed. The issue of ethics is particularly important as this kind of technology is thought to be able to create a panopticon or a dystopian future if used massively, as predicted in the Orwellian world (Özer & Tarakçioğlu, 2019).

In Scenario V, the central issue is about technology that can have a person's character or personality. Another theme that often appears in BM is about technology that has awareness or copy of someone's consciousness. Episodes related to this theme include San Junipero, White Christmas, USS Callister, Hang the DJ, Be Right Back, Black Museum, and Playtest. This form of technology is often associated with hypothetical technology for uploading thoughts, that is, the ability to transfer the human mind into a computer device called the Whole Brain Emulation (WBE) (Häggström, 2017).

Haggstrom (2017) describes a transhumanist dream in uploading thoughts into computers as something that is both expected and anticipated. WBE supporters assume that with this technology, humans are no longer bound by fragile human bodies, as they can move their bodies as they wish or move them entirely into the virtual world. Furthermore, WBE will enable us to make copies of ourselves, which, although not everlasting, can significantly increase human's life span. This technology can avoid worries about deaths that occur due to accidents, because losses in such events can be corrected simply by re-accessing the last backup copy of the memory (Häggström, 2017).

The implications of this kind of technology have been widely discussed (Sandberg, 2014; Häggström, 2017). Even the roadmap for the development of WBE (Sandberg & Bostrom, 2008) and its feasibility study (Sandberg, 2013) has been sufficiently addressed in the last few years. Many fundamental ethical problems in this technology have been expressed even before this technology manages to be materialized, which according to the predictions of several futurists, will be available in 2045 (Lewis, 2013).

The BM narrative presents similar themes and various possible applications in several episodes, as well as the implications they have on society. However, instead of giving clear answers, BM itself presents more problems regarding the relationship between technology and humanity, which is left as a wide-open discussion for the audience.

c). Architecture in *Black Mirror*-like Future

Based on the explanation above, there are two possible scenarios that will become the framework for developing predictions about architecture in the future. Scenario A is about

the form of architecture in the future when technology can intervene in the human senses and an easily influenced society.

Perception of space, in essence, is a sensation processed inside human beings (Malnar & Vodvarka, 2004). From that notion, it can be suspected that changes in the way humans feel sensations will also affect the way humans interpret space. Future architectural designs will also be closely related to the sensations felt by humans, but in a way that is different from what we know today.

Future building designs in the form of clean metallic white buildings, glass facades, with extreme curves and structures, which often appear in sci-fi films may never happen. If technology has been very immersive in human life, building users can easily change the appearance of the building facade at will. Perhaps, even physical building designs have no need to exist at all.

In this scenario, technology enables everything that people want to feel to be programmed directly to the users. Ultra-immersive AR can replace the role of facades in buildings. It is also possible that the room no longer needs a physical wall because the barrier can be programmed directly into the personal view. Also, landmarks may not be needed anymore since the community has relied on geo-tagging technology, and everyone can access it directly - or feel it virtually, depending on the individual AR setting. This condition allows humans to come to a place simply by following the directions from the AR programmed in their bodies. This will significantly change the landscape of the city and its surroundings.

However, these conditions raise various ethical questions about the consent and safety of building users. Can a building facade that is projected through the AR display be downloaded freely or will it need specific consent? Architects certainly want the design they create to be experienced by as many users as possible, and downloads with permission will hinder this. Conversely, if a similar design can be automatically downloaded and seen by everyone, is there any difference between this kind of program and spams or viruses that threaten the user's digital devices? This would be beneficial for users who want to see the building, but not so pleasant for those who do not.

Similarly, if a building is designed to be hidden, is it ethical if the architect-programmers put down a kind of virus that interferes with the human vision that passes around the area to give a different view? For instance, the building would only be a concrete box without a facade, as the virus would provide the predetermined image for it. Further questions are raised, namely: Can building designs be experienced better with ultra-immersive AR? What is the effect on the skyline of a city in the future? Is physical construction still needed, or false images that appear in human vision are all that matters?

This condition may differ from Scenario B. This scenario is about the form of architecture in the future when technology can enter human memory, super AI technology is available, and communities begin use the WBE technology.

Robert Cannon expressed his concerns about the condition of education in the future when technology can eventually help human memory. According to him, when all knowledge can be accessed easily, and the process of analysis can be done with tools, the educational system as we know it will not be able to help many people. This is because today's education requires the ability to learn basic things that must be remembered and mastered, which have been adapted to fragmented skills, as in a Ford assembly line. The concept of past education without keeping up with the technology will result in educated people who are unable to compete in the workforce (Pew Research Center, 2014).

This condition can happen in architectural education. In this scenario, architectural education is presented as a short course with modules that only need to be uploaded into the student's memory. Even though creativity is one of the capabilities that an architect must have and still impossible to be replaced by a computer (Gunagama & Lathifa, 2017), the process of remembering various architectural references that should be exercised for a long time can be shortened in this scenario. This then leads to the next question that may be equally important, i.e. what is the right form of architectural education for the future?

Discussion about ethics in WBE (Bostrom &

Yudkowsky, 2011) also includes fundamental questions about the feasibility of the process and its implications for individuals. Even if this process is successful, can the program be concluded as having consciousness? What happens to personal identities if two identical copies are running in parallel?

Nevertheless, it is important to note that there will be many benefits from WBE for the future of architecture. If an architect can copy his/her consciousness and the replica can also design a building, there will be many jobs that can be completed simultaneously. Yet, ethical-legal issues will arise regarding moral status. Can the design be attributed to the architect or the replica? Is it legal if a conscious copy of an architect makes a design revision or takes over a project when the original human is absent?

Access to design programs that use awareness copies or super AI, in time, will be easy for everyone to use. This is similar to what happens nowadays, in which the technology which might seem very sophisticated some time ago has become commonly used today. It does not rule out the possibility that in time, architect services will also switch to the application of more advanced technology, which is currently still considered fiction. This condition leads to another big question. In the future, will architectural education that gives birth to new architects still be needed, if every client can easily access a replica of a famous architect or super AI and request a design from it?

It has been established that the socio-cultural conditions of the community determine what architectural forms are considered good at the time. If in turn, the use of surveillance technology in the future society becomes very massive, what will the architecture look like in this scenario? Will the discussion of public-private dualism still be a consideration in the design? In a panopticon society, is it transparent design, or is it the opaque and thick design that will be the main style in architecture? Another fundamental question that is no less important is: How do we define space when there are no boundaries between inside and outside? Especially when all human activity can be monitored by technology, at any time, any place, any service, and any network? Furthermore, if the social fabric of the future community does lead to a transhumanist society that no longer needs a physical body, then what does architecture look like in that scenario? Will virtual-digital space replace physical space? Can server blocks that contain quantum hard disks that will accommodate human consciousness be compared with architecture?

The questions raised may not have been widely discussed, appear very distant, visionary, dystopian, exaggerated, and be in the spectrum of extreme anxiety. However, it does not mean that this will not happen at all. Gradually, current developments can be considered as a foothold, and are predicted to become the forerunner of advanced technology as described above.

BM is present not only as a spectacle, but also as a part of modern culture that invites the audience to ask questions, and provides a space for discussions of fear and anxiety about technology without the need to feel afraid to be called “Luddite” (Librarian Shipwreck, 2015). By referring to many things that happened on the show, we can build a discussion rarely addressed in regard to the current technology. The narrative displayed in BM looks very dark and uninteresting, but the reflections that appear can be meaningful to seek understanding about humanity and the current and future technologies.

In time, the emergence of new technologies will also affect our ways of life, cities, habits, and architecture, which will create new challenges, concepts, and buildings in the 21st century. As architects and planners, our responsibility is to stick to kindness and always remember that everything that needs to be done is for the prosperity of humanity (Völker, Sariyildiz, Schwenck, & Durmisevic, 1996).

Conclusion

Based on the discussion, several important things can be concluded. First, by recognizing its strengths and weaknesses, scenario analysis method can be used to process science fiction narratives to predict their implications for a hypothetical future. This needs to be done as a creative process in identifying challenges and opportunities that might occur in the future. In this paper, BM was chosen as the discussed narrative, because its format as a series of sci-fi anthology is considered strong enough to show the relationship between humans and

various technological concepts.

There are several technology premises in BM. From its shape, technology can be categorized into several levels, ranging from those unattached to the human body, inherent to the body, and connected directly to consciousness. The themes of future scenarios include issues on impulse and motivation, sensory perception, automation, memory, and cognition. Even though it may seem like an overstatement, the possibility of architectural designs in scenarios A and B presented in the discussion seems to depend on how humans and society behave toward technological sophistications that might occur. The exploration of design ideas in both scenarios is closely related to the increasingly immersive virtual-digital possibilities. This is not to eliminate physical design, but it can be suspected that the diminishing physical sensations will have a significant impact on how the architectural design, in reality, is formulated. It will be very interesting to discuss this subject in other studies, either through the next season's BM episodes or different media of science fiction.

Again, the reflection seen in BM is very dark and uninteresting. However, from each episode, the potential of technological development and its implications for society can be observed. Technology will also develop in architecture and any excess that can arise from it will still be felt by architects and planners whether they are ready or not. This paper seeks to question part of the anxiety about the future, and indeed without intention to answer it clearly. It is so that the questions delivered can ignite other ideas that are more profound, as well as to reflect and re-question the appearance of humanity and its architecture in the future.

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Note

List of abbreviated names for Seasons (S) and Episodes (E) in *Black Mirror*:
S1-E1 : *The National Anthem*
S1-E2 : *Fifteen Million Merits*
S1-E3 : *The Entire History of You*
S2-E1 : *Be Right Back*
S2-E2 : *White Bear*
S2-E3 : *The Waldo Moment*
S2-E4/SP: *White Christmas (Special Ep.)*
S3-E1 : *Nosedive*
S3-E2 : *Playtest*
S3-E3 : *Shut Up and Dance*
S3-E4 : *San Junipero*
S3-E5 : *Men Against Fire*
S3-E6 : *Hated in the Nation*
S4-E1 : *USS Callister*
S4-E2 : *Arkangel*
S4-E3 : *Crocodile*
S4-E4 : *Hang the DJ*
S4-E5 : *Metalhead*
S4-E6 : *Black Museum*