

A CAPABILITIES SOLUTION TO ENHANCEMENT
INEQUALITY

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Abstract

Human enhancements will dramatically alter individuals' capabilities and lead to serious harm if unregulated. However, it is unclear how states should act to mitigate this harm. I argue that the capabilities approach provides a useful metric to determine what action states should take regarding each enhancement technology. According to the capabilities approach, states are responsible for ensuring their citizens are able to function in certain ways that are essential to human life. I consider the impact of a range of enhancements on individuals' capabilities in order to determine what actions states should take regarding each technology. I find that in order to be just and prevent harmful inequality, states will need to ensure many enhancements are available to their citizens. I also explore a range of other regulations aimed at harm prevention. Considering the impact of enhancement technologies on human capabilities, and the appropriate regulatory options for states, under the guide of the capabilities approach allows me to demonstrate that the capabilities approach can provide valuable, realistic, advice to guide public policy in response to enhancement technologies.

Chapter 1: Introduction

Left unregulated, technology that alters what people are able to do will cause vast, inescapable, inequalities. Those who can afford these technologies will find themselves at a huge advantage in society, enjoying even greater benefits than they do now as they enhance themselves beyond anything humans are naturally capable of, while those unable to afford these technologies will be left unable to participate in society to even a basic level. In Swindells (2014) I argued that, for states to be successful in preventing harmful inequality, they must ensure essential technologies are available to all of their citizens. However, the question of how states can determine which technologies they must ensure their citizens can access in order to prevent harmful inequality, and so meet the requirements of justice, remains. In this thesis I argue that the capabilities approach provides a framework that allows states to determine which technologies they must ensure their citizens are able to access in order to be just and avoid harmful inequality.

In Swindells (2014) I argued that inequality of access to enhancement technologies will exacerbate current harmful inequalities; the wealthy already benefit from their financial situation and future enhancements can be expected to increase this advantage. For example, the wealthy can already use their position to access better education and nutrition, which in turn enhances their cognitive functioning (Sahakian and Morein-Zamir, 2007, p. 1159). Future enhancement technologies have the potential to allow the wealthy to further increase their IQ beyond even that of the most naturally gifted. Cognitive enhancements have many benefits beyond higher job status and salary; they can reduce the risk of substance abuse, crime, and many illnesses while increasing quality of life, social connectedness, and political participation (Sandberg and Bostrom, 2007, p. 208). Consequently, the benefits associated with higher IQ, such as increased income (Sandberg and Bostrom, 2007, p. 216), and prevention of a wide array of social and economic misfortunes (Bostrom and Sandberg, 2009,

p. 330), are likely to increasingly become solely available to those who are financially better-off, further increasing the advantages packaged with wealth. This will exacerbate inequality by providing further benefits to those with the ability to pay, and preventing the least well-off from accessing these benefits.

States should be concerned with the potential of enhancement technologies to increase inequality as a range of negative outcomes are associated with more unequal states, and these negative outcomes apply to everyone in that society, not just the least well-off. For example, individuals in states with higher levels of inequality are at greater risk of mental disability and psychiatric hospitalization (Hudson, 2005, p. 16); and they can also be expected to have lower economic mobility (Andrews and Leigh, 2009, p. 1492); as well as poorer general health; higher levels of infant mortality; lower average life expectancy; increased obesity; greater illicit drug use; higher homicide and violent crime; a greater prevalence of depression; and, lower self-reported well-being (De Vries, Gosling, and Potter, 2011, p. 1978). This increase in negative outcomes can be at least partly attributed to an increased importance of social hierarchy in a more unequal society. In such a society an individual's position relative to others is more important, and, consequently, individuals become more competitive, less trusting, more self-focused, less friendly, and less cooperative (De Vries, Gosling, and Potter, 2011, p. 1979). More unequal societies have lower levels of agreeableness, and associated negative health outcomes, such as poor diet, and increased alcohol and cigarette consumption (De Vries, Gosling, and Potter, 2011, p. 1984). These numerous social problems are more common in unequal societies, for everyone in the society, not just the less well-off (Wilkinson and Pickett, 2007, p. 1972). Therefore, increased inequality, and the associated negative consequences, should be of concern to both the less and more well-off in society, and a just state should act to mitigate inequality and prevent these harms.

There is also a concern that the development of technologies that fundamentally alter what humans

are capable of could negatively impact the idea of natural human equality that is the basis of political and moral equality (Fukuyama, 2002, p. 9-10). The concern is that the development of these technologies could create an uncrossable divide between the enhanced and the unenhanced, creating two distinct classes of people. This concern is coupled with the idea that in the future when there are greatly enhanced people there is no guarantee that they will care about the unenhanced, those in poverty, and they may be unwilling to pay for public goods, such as education (Singer, 2014, p. 4470). Therefore, the development of these enhancement technologies may even further increase the importance of one's position in the hierarchy of society by creating two completely separate classes of humans where the enhanced individuals may not feel the need to protect and ensure the well-being of the unenhanced. A solid immovable hierarchy would form where, based on ability to pay, some people would be significantly better-off than others, who would never have the ability to catch up as they cannot afford the technology necessary for class mobility. There is concern that those able to afford enhancement technologies will be buying their own well-being at the expense of a greater social good (Caplan and Elliott, 2004, p. 174). Unregulated enhancement technology can be expected to increase class struggle and the importance of one's position in the hierarchy, further increasing the harms associated with inequality for all members of society.

Harm, such as that created by inequality, does not require extreme deprivations to warrant consideration; injustices exist even when no extreme deprivation is present. For example, if a HET increased political influence for those who could afford it, such as by allowing increased communication capacities, this would be an injustice to those who do not have access to this technology, although they suffer no extreme deprivation (Buchanan, 2011b, p. 250). States must act to mitigate the harms that the development of enhancement technologies can be expected to exacerbate, even if they are not associated with extreme deprivation.

Approaches to public policy can increase inequality by pushing the technology underground,

increasing cost, and primarily allowing the rich access, or reduce inequality by supporting responsible development and ensuring broad access. Without public funding and support, it is likely that some enhancement technologies will be out of reach of many. The divide between those who are 'normal' and those who are enhanced above average will continue to grow, and be based on individuals' ability to pay. In Swindells (2014) I argued that the best solution for regulating the consequences from enhancements is for the state to ensure that technologies which are necessary are not solely available based on ability to pay, and, further, that this option is best not just for the less well-off but also for the wealthy. I argued that unregulated access, in a free-market system, would be problematic as it would lead to the kind of inequality states must attempt avoid. I also argued that an outright ban on these technologies would be unsuccessful at mitigating harm as it is unlikely to be practically enforceable, and attempts to enforce such a ban would likely lead to increased inequality. Further, I argued that an outright ban would also be undesirable as it would remove the possibility of individuals and society enjoying the benefits of many enhancement technologies. Enhancement technologies have the potential to provide many benefits to both individuals and society provided that they are fairly distributed. Therefore, I concluded that states should ensure that important enhancement technologies are available to all of their citizens through public funding, as well as regulations on development and patents, that ensure lower costs and that access is possible for all.

This thesis will further examine these conclusions under the guide of the capabilities approach in order to develop a framework for states to determine how they must act in regards to enhancement technologies. Ultimately I conclude that the capabilities approach supports the state acting to ensure enhancement technologies to their citizens in order to prevent harmful inequality, but also that, at times, the capabilities approach may require the state to undertake further regulations, such as bans or other policies, to ensure that the basic entitlements of their citizens are secured.

Definitions

Human Enhancement Technology (HET)

This thesis is concerned with the impact and regulation of Human Enhancement Technology. The term 'Human Enhancement Technology' (HET) refers to any technology that increases or enhances what people are able to do. This ranges from a ballpoint pen that increases communication abilities to a bicycle that increases individuals' transport and movement abilities. In the future, HETs will be developed that allow people to learn quickly and improve selective retention, unlearn phobias and addictions, increase fine-grained control over the learning process, increase creativity, improve memory, change our personality, grow new organs, repair our brains, and extend life expectancy beyond 100 years (Sandberg and Bostrom, 2007, p. 203-207; Fukuyama, 2002, p. 8-9). Many HETs are not directly or permanently attached to individuals, such as reading glasses, but they are nonetheless considered HET due to their ability to increase or improve human abilities. This will be the same for technologies that are developed in the future.

Although increasing human capabilities is the definition of HET, many were not originally developed for this purpose. Many were developed as therapies for disabilities, such as Ritalin, which was developed as a treatment for attention deficit hyperactivity disorder, and is now used by college students to enhance their cognition (Lamkin, 2012, p. 347). Similarly, Modafinil was originally developed as a treatment for narcolepsy, and is now used to reduce performance decrements from sleep loss or jet lag (Sandberg and Bostrom, 2007, p. 204). Because of this, the exact HETs that will be developed in the future are unclear, and predicting their outcomes is difficult. Therefore, this thesis takes a very broad approach to the term 'Human Enhancement Technology' and relies only on the fact that they are technologies that increases what humans are able to do in order to group them together under the term 'HET'.

Central Capabilities

This thesis argues that the justness of the state, and its equality, can be judged by its success in fulfilling the basic requirements outlined by the capabilities approach. This position is argued for in chapter 2. The capabilities approach argues that individuals are entitled to be able to be and do certain things, to achieve certain central capabilities, and that ensuring that its citizens have this ability is the basic requirement of a just state. The ability to achieve these central capabilities is what makes a life one of human dignity, as it allows individuals to achieve the lives they have reason to value. A detailed analysis of exactly which capabilities are included under the term 'central capabilities', and are the basic entitlements of any human, is also developed in chapter 2.

Equality

Throughout this thesis I refer to equality in the sense defined by the capabilities approach. Under this approach, two individuals who are equally able to achieve the central capabilities can be considered equal, even if they do not both actually achieve them; what is important is their opportunity to achieve their basic entitlement (Nussbaum, 1997, p. 289). Individuals need not be the same in every respect to be equal, but they ought to have the same opportunities to achieve in essential areas. Rather than focusing on numerical equality, and treating individuals as indistinguishable, the state should treat individuals proportionally to their endowments. At times this will require providing more help to some than others to ensure that all are able to achieve the central capabilities they are entitled to. For example, a pregnant woman requires more food than a comparable woman who is not pregnant, and, thus, needs different resources to be equally able to achieve the essential functioning of being fully nourished.

The state should both be concerned with mitigating the involuntary differences between individuals, and ensuring that individuals are not held to ransom by their past actions. If individuals' past actions mean that they are now unable to achieve a central capability then the state still has some

responsibility to these individuals. For example, consider an individual, who, when she was a teenager, did not fully engage in the schooling that was offered and now has a limited ability to communicate or pursue higher paying employment. It does not seem just that the state could simply 'wash their hands' of this person, but rather the capabilities approach would require that it should if possible allow this individual the opportunity to achieve these capabilities now, for example by providing adult education classes. Although this is not explicitly required by the capabilities approach it seems to be a natural consequence of the theory. In this case, personal responsibility is still relevant as the individual must now act to accept the adult education if she wishes to achieve these functionings. If the state ensures that all individuals, even those that rejected the option in the past, have the opportunity to achieve central capabilities then they are just, even if some individuals still choose to reject these capabilities for various reasons. What is essential under the capabilities approach is that people have the real opportunity to achieve these central capabilities that will allow them to pursue the lives they have reason to value with dignity and respect equal to that of others (Nussbaum, 2004, p. 40).

Under the capabilities approach, individuals are entitled to certain central capabilities, and two individuals who are both able to achieve these central capabilities are equal in the respects that matter. However, the state should not pursue individuals being equally able to achieve capabilities simply because they value equality. Rather, although equality has instrumental value it is achieved as a by-product of states ensuring their citizens are able to achieve their basic entitlements. One individual may be more able to achieve a central capability than another individual, despite a state's best efforts to ensure they are both fully able to achieve this capability, but this state should not be considered unjust, and certainly should not remove the higher achieving citizen's ability to achieve simply to make them equal to the less able citizen. For example, states are not expected to ensure no one can see if there are some blind people that cannot be given sight. Rather, a state is just and equal if it does everything reasonably possible to ensure that all of its citizens with the potential to

see are able to achieve this capability. Equality is sought not as a valuable end in itself, but rather as a means or by-product of the good just states are truly seeking, that is to mitigate harm and increase well-being.

One of the primary responsibilities of the state is to ensure its citizens are able to achieve their basic entitlements, central capabilities. In doing so the state will ensure equality in important respects for its citizens. However, if two individuals are not equally able to achieve a central functioning this does not mean that the state should necessarily be considered unjust. Their responsibility is to ensure their citizens can achieve the central capabilities to the highest level reasonably possible, and at times individual differences will make it impossible for all individuals to fully achieve. Ideally the state would be able to ensure all individuals have the ability to fully achieve the central capabilities to which they are entitled. However, in order to be just, capabilities theorists claim that states simply must do whatever is reasonably possible towards achieving this goal (Nussbaum, 2011, p. 27). Individual differences and luck seemingly make it impossible for states to be fully equal in this way, however, this does not make the goal less valuable. Inequality is harmful, for everyone in society, not simply the worst-off, and, thus, it is in the interest of the state and society to mitigate and reduce inequality as much as possible (Hudson, 2005, p. 16; Andrews and Leigh, 2009, p. 1492; De Vries, Gosling, and Potter, 2011, p. 1978; Wilkinson and Pickett, 2007, p. 1972). Simply put, even if full equality of central capabilities is an unachievable goal it is still a valuable pursuit and the pursuit of this kind of equality with the goal of harm prevention will be the focus of my thesis.

Overview

This thesis begins by outlining why the capabilities approach should be used as the measure of a just and equal state, and, therefore, why in this thesis I recommend it as the framework for states to

determine what action they must take in regulating HETs. The capabilities approach judges the justness of a state by considering how well its citizens are doing in terms of what they are able to do, their capabilities. This approach defines well-being as functioning, rather than how individuals feel or how many goods they have (Sen, 1992, p. 39). States exist to protect and ensure their citizens basic well-being and the capabilities approach gives us a clear measure of whether they are achieving this goal. Therefore, the capabilities approach makes it the job of the state to ensure individuals can achieve their basic entitlements, defined as certain central capabilities. The capabilities approach judges a state as just and equal if they do their best to ensure their citizens' central capabilities, and I argue that at times this requires the state to ensure that a HET is available to all of its citizens.

To explore this argument I consider what would be required for a just state to be required to ensure a HET to its citizens. Under the capabilities approach the technology would have to be necessary for an individual to achieve a central capability that a just state is required to ensure. For a technology to be necessary for the central capabilities it would have to change what individuals need to be able to do in some important way; if the central capabilities can be adequately achieved without this technology there is no reason that a state should ensure it to its citizens. I argue that variation in the capabilities individuals can achieve is an intrinsic part of the capabilities approach, and, further, that altering capabilities is the purpose of many technologies, especially HET, as they are developed specifically to change what people are able to do. Therefore, the conclusion that some HETs will alter what is required for an individual to achieve the central capabilities seems to clearly follow.

I argue that technologies can change what individuals are capable of in a way that fundamentally alters what is required for an individual to fully function as a citizen, and, therefore, alter what just states must ensure. When a HET alter what individuals must be able to do to fully function as a

citizen in society, and pursue the life they have reason to value, then, under the capabilities approach, the state must ensure this technology if it is to be even minimally just. For a technology to alter the central capabilities that individuals are entitled to it must alter the capabilities that an individual requires to live a life of human dignity, and functioning, to a similar level to that of others. If a technology alters a central capability, meaning that it alters what an individual must be capable of in order to be considered a fully functioning citizen, then the capabilities approach requires a just state to ensure their citizens have access to this technology.

After considering the potential of the capabilities approach to apply to the regulation of HETs, in chapters 3-4, in chapter 5 I consider an example of a HET that a just state is already expected to ensure, education. Education is a technology that is considered essential to individuals functioning in society, and, thus, states are expected to ensure it to all of their citizens in order to prevent serious inequality. Education provides many essential skills individuals require to participate in society and pursue the life they have reason to value, therefore, it is a HET that is necessary for individuals' central capabilities and its provision is required by the capabilities approach.

Chapters 6-7 consider a range of HETs that have similarly important impacts on individuals' capabilities. These chapters examine these examples to demonstrate that a state having a responsibility to ensure these technologies is not significantly different to their current responsibility to ensure education. For example, those without access to the internet today are much less able to participate in society; they are less able to communicate with others, achieve fulfilling employment, or participate in normal play compared to their peers. Due to this potentially harmful and serious inequality of capabilities that a lack of access to the internet creates, I argue that under the capabilities approach some states may need to ensure their citizens have access to this technology to be just. Another example of HET that states may be required to ensure for their citizens is life extension technology, which will significantly alter individuals' central capabilities

for life. Inequality of access to this technology would have serious implications for society, and the ability of individuals to participate in it. An individual with a significantly shorter life expectancy than his peers will be much less able to achieve the life he has reason to value and function equally as a citizen, both measures of well-being. Therefore, under the capabilities approach these life extension technologies would also have to be ensured to all individuals by a just state.

Because we cannot predict all the future technologies that will be developed, or their consequences, a successful framework must be able to apply to any technology that is developed. Therefore, in chapter 8, I consider genetic modification as an example to examine the capabilities approach's ability to apply to the regulation to HET more generally. Genetic modification could allow individuals to develop completely new spheres of capabilities, and, thus, predicting its impact on the central capabilities individuals need to participate in society is difficult, if not impossible. However, I argue that the capabilities approach is also able to deal with these kinds of unpredictable technologies.

A state can use the capabilities approach to consider whether a new technology is necessary for its citizens to be able to fully function and pursue lives they have reason to value, then use this information to determine whether the state must ensure the availability of that technology to its citizens. It is unnecessary for me to go into detail about the impact of genetic modification, or any other potential HET, on our capabilities, rather, these examples are used to demonstrate how the capabilities approach can deal with the unpredictable nature of future technological developments. I argue that the capabilities approach provides such encompassing and flexible requirements for a just state, and its obligations to its citizens, that it can be expected to effectively deal with any developments that may arise in the future. Thus, the capabilities approach is an effective tool for combating inequality and harm posed by HET as it allows states to determine what regulatory actions will best prevent harm and ensure that the state is just.

In chapter 9, I consider the potential limitations of my thesis as well as the potential limitations on the use of the capabilities approach. This includes considering whether ensuring capability equality can be expected to solve the harms associated with other forms of inequality, concluding that a focus on ensuring capability equality is likely to be the most realistic and valuable approach for state policy to prevent harm. In this chapter, I also acknowledge that actions other than making the technology available will be required to ensure equality; for example, some individuals will not accept the technology even if it is freely available, and the state still has obligations to these individuals and must take other regulatory actions. I also consider the possibility of other solutions to prevent harm from HET, such as banning certain technologies. I argue that if these kinds of actions are necessary this too will be determined by the capabilities approach.

I finally conclude that the capabilities approach is a productive and useful measure of the justness of a state and that it can be successfully used to determine what regulatory actions states must take regarding human enhancement technologies. Although I argue that the capabilities approach will require a just state to ensure many HETs to its citizens, the capabilities approach can also be used to determine other actions required to ensure justice and equality regarding each technology. This allows the state to use the capabilities approach to determine what actions they must take regarding any HET that is developed. My thesis defends and expands upon the conclusions found in Swindells (2014) but also provides further support for the use of the capabilities approach in determining the justness of a state by demonstrating its ability to cope with novel changes and technologies.

Chapter 2: The Capabilities Approach

The primary responsibility of a state is to protect its citizens from harm and to ensure their basic entitlements are met. For a state to be just it must achieve this goal to the best of its ability. However, exactly what these entitlements are, and what it means for an individual to be free from harm remains a matter of contention. Traditional measures of justice have been compellingly rejected by the proponents of a new theory, the capabilities approach. The initial developers of the capabilities approach, Amartya Sen and Martha Nussbaum, argue that the capabilities approach avoids the numerous failings of other theories of justice, and, thus, is a more successful measure of a just and equal state.

The benefits of the capabilities approach over other theories led to it quickly gaining respect. Since 1990 the Human Development Reports of the United Nations Development Programme (UNDP) have used the capabilities approach to enable inter-country comparisons and assess the quality of individuals' lives (UNDP, 1990). The capabilities approach allows comparisons to be effectively made between how well individuals are doing in terms of their ability to achieve certain central capabilities, and it allows states to be judged on their success in ensuring their citizens can achieve these basic entitlements. It also provides a practical guide for public policy developments and allows states to both be compared against each other and compared against an objective measure of justice to determine whether they have successfully achieved their requirements. The evidence suggests that the capabilities approach is worth considering as a measure of justice, and the arguments in this thesis further help to establish the successfulness of the capabilities approach.¹

¹ A complete defence of the capabilities approach is outside the scope of this thesis and well discussed by others. (Specifically see: Sen 1979, 1984, and 1992, and Nussbaum 1997, among others).

The capabilities approach argues that the justness of a state should be measured by whether or not its citizens are able to achieve certain central capabilities, to do things that it argues are centrally important to human life, and pursue the lives they have reason to value (Sen, 1992, p. 81). The goal of a just state is to ensure that its citizens have sufficient and equal real opportunities to achieve any valuable end or life of their choice, to be or do what they have reason to value. Individuals must have the freedom to select between possible lives, which involves them being able to achieve any one of them; the one that is selected is irrelevant as it is the ability to choose that is valuable (Sen, 1984, p. 319).

The capabilities approach argues that states must focus on the actual outcomes their citizens can achieve, rather than on another measure such as the goods they hold. Under the capabilities approach, goods are only important as instruments to achieve other ends that are truly valuable, namely, having capabilities. Similarly, the capabilities approach does not encourage focus on how individuals feel in the way a utility measure does, because individuals are different and have diverse reactions to various circumstances, so utility provides an unreliable measure of equality (Nussbaum, 1997, p. 281-283). Sen (1992, p. 39) argues that, rather than considering an individual's well-being in terms of what goods he holds, or how he feels about the goods he holds and the life he leads, a person's well-being can be seen as the quality of his functioning, his ability to be and do certain things central to human life. Holding resources or being happy does not necessarily equate to well-being; an individual can be happy while being deprived, or hold many goods without being able to achieve the valuable ends that these goods are meant to ensure. Therefore, if states focus on utility or resources as measures of justice or equality they may not actually ensure that their citizens have well-being. Rather, states should focus on the outcomes that are important for their citizens to be able to achieve, as being able to achieve these is truly well-being, and resources, for example, are only instrumental for this goal. Due to differences between individuals the same goods may not allow them to achieve the same ends; a disabled individual may require a significant number of

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goods to achieve the same level of mobility a non-disabled individual can achieve with very minimal resources.

The capabilities approach also argues that states should not be judged on the outcomes their citizens actually achieve, but rather the ability of their citizens to achieve certain outcomes should they choose to do so. If states were judged by the functionings, being and doing certain things, their citizens actually achieved they might be compelled to reduce their citizens' freedom by forcing them to achieve functionings they would otherwise freely choose to avoid. An individual may have the capability to achieve an essential functioning and freely choose not to, but if achieved functioning was the measure of a just state it would seem that the state should force the individual into achieving the functioning against his will in order for the state to be just. This seems wrong; a just state should not be one that infringes upon the rights and liberties of its citizens as individuals should have autonomous and free choices. Therefore, although actually achieved functioning is well-being, it is not a good way to judge a state as a citizen could live a full life without achieving every valuable functioning, and, in these cases, the state has no right to force functioning upon them (Nussbaum, 1997, p. 288-289). Therefore, the capabilities approach argues that the state should concern itself with individuals' abilities to function, that is, their capabilities. The state must focus on ensuring that its citizens have the opportunity to achieve the capabilities central to a human life; whether they choose to achieve them or not is the concern of that citizen, not the state. As long as its citizens have the real ability to achieve the functionings central to human life the state has done all that is required.

The difference between ensuring that individuals have the ability to achieve functioning and forcing them to achieve functioning is highlighted by capability theorists using the difference between fasting and starving (Nussbaum, 1997, p. 288). Being fully nourished is an essential aspect of well-being, but this does not mean that an individual choosing to fast and an individual starving

involuntarily should be judged as equally well-off. The individual choosing to fast, even though he has adequate access to food, has the ability to achieve the functioning of being fully nourished, although he chooses not to do so, and, thus, can still be said to be living a fulfilled life as his choice to not be nourished is freely made. While the person starving due to an involuntary lack of food lacks an essential component of a fulfilled life as he has no choice whether he eats or not, and, thus, the state has not fulfilled its obligation to this individual. This example highlights how a focus on the ability to function, rather than actually achieved functioning, allows the justness of states to be measured without requiring states to reduce their citizens' liberty by pushing them into unwanted functionings (Nussbaum, 1997, p. 288).

Capabilities theorists claim that states exist in order to ensure the basic entitlements of their citizens, and, in turn, that these basic entitlements are certain central capabilities, the ability to achieve certain functionings (Nussbaum, 2011, p. 25). Nussbaum (1997, p. 274) supports the commonly held view that entitlements are correlated with duties, and, as such, if someone has an entitlement to something, there exists a duty to ensure it. States have a duty to ensure certain central capabilities to their citizens as these are individuals' basic entitlements and securing them is the primary purpose of the state (Nussbaum, 2011, p. 26). The capabilities approach argues that all humans have a basic entitlement to certain central capabilities, and in order to be just states have a duty to ensure their citizens have these basic entitlements. Therefore, states can be judged and compared by how well they ensure their citizens the central capabilities to which they are entitled. For a state, and the individuals within it, to be considered as 'doing well' individual citizens must have an adequate level of well-being, and this requires they have the capability to achieve certain central functionings (beings and doings) (Sen, 1992, p. 40-41).

Charles Beitz (1986, p. 287) raises a concern with the capabilities approach by arguing that it faces serious difficulty because not all capabilities should be equally weighted. Sen (1992, p. 45)

responds to this objection by arguing that the distinction between capabilities is an essential aspect of the approach. He argues that not all capabilities are valuable, nor are all that are valuable equally important, rather, the relative importance or weighting of different capabilities depends on the society and its application should be culture dependent (Sen, 1979, p. 219; Sen, 1992, p. 46). Sen generally leaves the capabilities he thinks states must ensure vague and open to interpretation, he believes that it should be up to individual democratic states to determine which capabilities are essential in their context. This is because, he argues, the differences between states, locations and cultures are such that they are the only ones that can determine which capabilities are essential for their citizens (Sen, 1979, p. 219). For example, one state may determine that it is central that its citizens have the capability to communicate instantly with anyone, anywhere, in the world, while another state determines that its citizens only need to be able to communicate with others in their immediate vicinity.

However, Nussbaum (2003, p. 35) argues that Sen's response to the problem of selecting and weighting capabilities is insufficient. She argues that his proposal that individual democratic states should be able to determine what capabilities to ensure, and their relative weighting, is problematic due to the potential for them to be weighted in a harmful way (Nussbaum, 2003, p. 41-47). Obviously not all freedoms or capabilities are important, some are even harmful, such as the freedom to rape and beat your wife. If individual states are able to choose the capabilities they ensure, and their weighting, they have the potential to select unimportant, or even harmful, capabilities and fail to ensure those that are essential (Nussbaum, 2003, p. 41-46). Nussbaum (2003, p. 46-47) argues that it is hopeless to simply state that 'all citizens are entitled to freedom understood as capability', as Sen seems to suggest we do, as from this it would be impossible to say whether a society is just or not. Instead she argues that the entitlement to certain central capabilities is pre-political, and this entitlement belongs to people independently of membership to a state; these entitlements would be there even in the absence of any political institution (Nussbaum, 2011, p. 25).

Therefore, it is irrelevant what each state believes it must ensure as all humans have the same basic entitlements that any state must ensure if it is to be just. These basic, pre-political, entitlements generate the requirements that political institutions must meet in order to be even minimally just, as it is the job of the state to secure the basic entitlements, central capabilities, all humans are entitled to (Nussbaum, 2011, p. 25-27).

Nussbaum's claim is that there are certain requirements a state must meet to be just and that this allows us to objectively judge the justness of a state. If states were able to determine their own requirements of justice then meeting these requirements would not hold much weight, nor tell us much about the conditions of life for individuals within that state. One state could argue that only the capability to walk around your own room was essential, and, thus, it could have high marks without actually ensuring anything else for its citizens. Similarly, a state could argue that the capability to beat your children was important while the capability to avoid being beaten was not, and this state, with many beaten children, obviously with a low level of well-being, would also be given high marks. Conversely, a state that argued that it was essential for all its citizens to enjoy helicopter rides and champagne for breakfast would be given low marks if its citizens were unable to do this, even if they were all in good health and had all of the capabilities that would generally be considered essential for a full life. 'Just' according to a state's own measure does not ensure its justice at all. Leaving it up to states to determine which capabilities are essential to ensure has the potential to result in harmful outcomes.

Sen could respond that a democratic state would not agree that these kinds of capabilities are those worth defending. However, some states do argue that harmful capabilities are essential while ignoring others that are generally considered essential. For example, in 2009 a law was approved in Afghanistan that allowed Shia men to withhold food from their wives if they did not have sex with them, effectively condoning marital rape (Page, 2009). Further, if Sen believes that most states can

be expected to select similar capabilities as those worth defending then it seems that a broad objective list can be created that all states would agree to.

Nussbaum (2003, p. 35) argues that without commitment to an external list of essential capabilities we cannot know what even the minimum requirements of a just state are. She points out that under Sen's guidance the Human Development Reports of the UNDP do not specify a given level of health service or educational provision that a just society must deliver, they simply compare nations in these areas (Nussbaum, 2003, p. 35). This means that they can only compare the justness of states to each other, this could mean that while some are better than others none meet even the minimum requirements of justice. Nussbaum (2003, p. 36) argues that creating a list of the central capabilities individuals are entitled to allows the capabilities approach to provide a definite and useful guide for the basic entitlements a state must ensure to their citizens to be just. This, in turn, allows more than simply comparing states to each other, it allows us to judge states against a minimum level of justice to determine whether they are just, not only if they are doing better than their neighbour. If we simply compare states to others, one state may be described as more just than another even though it too is unjust. An external, objective, list or requirement of justice will allow states to be judged separately from other states while also allowing them to be compared to each other along a scale of justness.

As an alternative to Sen's problematic lack of specification, Nussbaum provides a detailed list of the central capabilities that she argues should be the goal of public policy (Nussbaum, 1997, p. 277). Nussbaum's focus is on creating a working list of central capabilities that can be the focus of political planning, by encompassing the human capabilities that are of central importance to any human life (Nussbaum, 1997, p. 286). The list should allow people from different traditions and backgrounds, with different conceptions of the good, to agree that the capabilities included are those necessary for pursuing the good life (Nussbaum, 1997, p. 286). Nussbaum's list is always open to be

contested or remade but at this stage it is in the form of 10 central capabilities. They are as follows (Nussbaum, 1997, p. 287-288);

- 1) Life: To avoid premature death and live the length of a normal human life.
- 2) Bodily Health: To have adequate nourishment, shelter, and good health.
- 3) Bodily Integrity: To be free from violent assault, have opportunities for sexual satisfaction, choice in reproduction, and to be able to move around freely.
- 4) Senses, Imagination, and Thought: To use your human senses, imagine, think, and reason in a way developed by education, to express yourself as you choose, to use your own mind in a useful way, and to experience pleasure and avoid non-beneficial pain.
- 5) Emotions: To be emotionally attached to things outside ourselves, to love, be loved, grieve, be grateful, experience longing, and be angry when appropriate.
- 6) Practical Reason: To critically reflect on your life and your own conception of the good.
- 7) Affiliation: (a) To interact socially, show concern for others, and have compassion. (b) To respect yourself and be treated as a dignified human being who is equally worthy to others.
- 8) Other Species: To have concern for, and live in relation to, plants and non-human animals.
- 9) Play: To enjoy pleasurable activities, to play, and laugh.
- 10) Control Over Your Environment: (a) to effectively participate in political activities and choices over your life and to have the right to participate politically. (b) To be able to own property of all kinds, to be employed, and to be free from unwarranted search and seizure.

The capabilities on this list are separate and indispensable, where one cannot be satisfied by giving a larger amount of another, as all are of central importance and distinct in quality (Nussbaum, 1997, p. 288). Not all human capabilities are included on Nussbaum's list as humans have all kinds of capabilities and not all of them are necessary for human dignity, some are inherently bad, such as the capabilities for cruelty, while others are trivial and need not be ensured by a just state (Nussbaum, 2011, p. 25). If a capability belongs on Nussbaum's list then states have an obligation to

protect and secure it for their citizens, using law and public policy (Nussbaum, 2011, p. 26). The capabilities required for a life worthy of human dignity are each part of a minimum account of social justice, and if a state fails to ensure these to its citizens it is not just and is failing its citizens (Nussbaum, 2003, p. 40).

In order to successfully secure a capability a state must ensure both the external preparation for action and choice as well as the circumstances that make it possible to exercise that function (Nussbaum, 2011, p. 25). For example, certain political and material circumstances, plus the ability to speak, developed through education, make it possible to have the capability of free speech (Nussbaum, 2011, p. 25). States could educate their citizens to be eloquent speakers, but they have not ensured their citizens have the capability for free speech unless they also ensure them the political right to speak freely in public (Nussbaum, 2011, p. 25). Nussbaum (1997, p. 290) argues that public policy should be aimed at this kind of 'combined' capability, ensuring individuals have the required internal states as well as ensuring the environment is suitable for the functioning. Providing this is the minimum requirement for a state to be just. States must ensure their citizens are able to achieve the central capabilities they are entitled to, but they need not push individuals into choosing to actually perform the functioning (Nussbaum, 1997, p. 290).

The capabilities approach argues that states must take action to actively secure their citizens the central capabilities to which they are entitled. They cannot simply avoid infringing upon them, rather they must actively prepare the institutional and material environment required for every citizen to have the ability to achieve their basic entitlements, that is, central capabilities necessary for a life of human dignity (Nussbaum, 2011, p. 31). This requires states to consider the obstacles preventing their citizens from achieving their full entitlement of capabilities and take action to remove these obstacles (Nussbaum, 2011, p. 32).

In the same way that states do not need to ensure their citizens can achieve every possible capability, they also do not need to ensure even the central capabilities on Nussbaum's list to the highest level they can possibly be achieved to. Nussbaum (2011, p. 27) specifies that it is reasonable to set the level of the capabilities that must be ensured quite high, but argues that it would be wrong to set it to a utopian level that removes the possibility of ensuring them. The level that is specified must also be responsive to the conditions of human life now, as it is unrealistic and unachievable if it requires a total transformation of the world in order to achieve it (Nussbaum, 2011, p. 27). In this way Nussbaum's approach reflects the sentiments of Sen's lack of specification by recognising the importance of responding to variations between the needs and circumstances of various states. Capabilities can be achieved to a variety of levels, and states need not ensure that their citizens can achieve all of the central capabilities to the highest level possible. Rather, Nussbaum argues, states must ensure their citizens can achieve the central capabilities to the highest level that each state can reasonably ensure to its citizens.

However, Nussbaum's lack of specification over what it means to ensure the central capabilities to the highest level possible is problematic. In a similar manner to Nussbaum's concern over Sen's lack of specification over which capabilities are essential it seems that we may need to be concerned over Nussbaum's lack of specification of what level the capabilities she claims are central must be ensured to. It is unclear exactly what level a state must ensure capabilities to in order to be just. It could be that a state would claim that it has ensured a capability to the best of its ability while many of its citizens still fail to achieve this capability to the degree that is necessary for them to fully function as citizens. At times the state's claim may be legitimate; if some of its citizens have incurable blindness, for example, then it does seem that this state has done everything reasonably possible to ensure the capability of sight even though some individuals still lack the capability. However, in other examples this may be less clear. Consider, for example, a state that offers eye glasses to correct the vision of those with vision problems, but does not offer laser surgery, and so

this further enhancement can only be accessed by the wealthy. In this case, it is less clear if the state has done everything reasonably possible to ensure its citizens have the central capability of sight to the highest level reasonably possible. It would be difficult, if not impossible, to judge the justness of states when the highest level reasonably possible is something that can only realistically be determined by the state itself. In the same way that Nussbaum feared states could choose to ensure harmful capabilities if the important capabilities were left to them to determine, they could also choose to not ensure the central capabilities to a high enough level by simply claiming that they were ensuring them to the highest level reasonably possible.

One potential solution is to integrate a theory such as the doctrine of sufficiency into the capabilities approach. The doctrine of sufficiency is based on the claim that inequality itself is not problematic, it is only harmful when those at the bottom do not have enough (Frankfurt, 1987, p. 22). Therefore, the claim is that harm is best prevented not by aiming for everyone to have the same, but by ensuring everyone (especially those at the bottom) has enough (Frankfurt, 1987, p. 21). Incorporating the doctrine of sufficiency with the capabilities approach may allow a state to be judged not on whether it has ensured a capability to the highest level reasonably possible, but rather whether it has ensured that all of its citizens have all of the central capabilities to a level sufficient to allow them to fully function as citizens and lead the lives they have reason to value. This level too would vary from state to state, but it would be able to be judged objectively by a third party.

Due to the harms inequality poses to everyone in society, not just the worst off, I do not fully support the claims of the doctrine of sufficiency as it argues that inequality is not harmful, and we should only care that those at the bottom have enough (Frankfurt, 1987, p. 22). Nor do I support its focus on resources, as, as discussed in chapter 2, resources are an unreliable measure of well-being. However, I do support the doctrine of sufficiency's claim that our primary concern in combating inequality should not be to bring everyone to the same level, but rather that we should aim to bring

everyone to a sufficient level. It seems clear, for the reasons discussed in chapter 1, that inequality is harmful not only because some do not have enough but also for the negative consequences associated with increased inequality. Therefore, a more productive solution is to compromise between a focus on everyone having enough (sufficiency), and reducing inequality as much as possible to mitigate the harms associated with a more unequal society. This would mean that the state should aim to ensure both that all of its citizens are sufficiently able to achieve the central capabilities and that there is not a huge discrepancy between the capabilities of the most and least well-off.

States may be unable to fully solve inequality, or perfectly ensure all of their citizens are able to sufficiently achieve the central capabilities, but they can still be considered just. We should not consider something unjust unless something can be done about it (Temkin, 1993, p. 13). If states ensure the central capabilities to the best of their ability they should not be considered unjust if nothing more can be done. It seems that the doctrine of sufficiency fits within Nussbaum's conception of the capabilities approach, as she talks about capabilities as minimum requirements of justice as they, at even a minimal level, allow individuals to function properly as citizens. Therefore, throughout this thesis I do not simply consider states just if they ensure capabilities to the highest level they claim is reasonably possible. Rather, I argue that states must ensure capabilities to at least a minimum level that allows an individual to fully function as a citizen in that society. Although this is not a position explicitly argued for by capabilities theorists, it clearly fits within at least Nussbaum's conception of the responsibilities of a just state, and, thus, is only a minor modification of the approach.

The capabilities approach was developed to measure the equality and justness of a state in terms of its ability to ensure its citizens' well-being, defined as their ability to achieve certain functionings. Inequality is undesirable, as it leads to harm and lower well-being. However, in order to solve

inequality and prevent harm we need to be able to determine what it means for a state to be equal in a way that avoids these harms. States exist in order to secure the basic entitlements of their citizens, and, therefore, a state that successfully completes this task can be considered just and individuals whose basic entitlements are met should be considered equal, as far as the state is concerned. There are many ways well-being and equality can be judged, however, due to its substantial benefits and practicality I will use the capabilities approach to further assess the conclusions of Swindells (2014) that states must ensure HET to their citizens. Specifically, I use Nussbaum's list of central capabilities due to its practical nature for this type of discussion. I do not attempt to defend the approach beyond what is required for a full understanding of it. However, its usefulness and applicability will be reflected on in light of its relation to HET. The capabilities approach provides a method for measuring how well people are doing within and between states, it allows judgement of whether an individual has a fair deal in life and whether a state is fulfilling its requirements. The capabilities approach is already used by the UNDP when comparing outcomes between states, and, therefore, assessing it further in this thesis will also provide more support for its use.

Chapter 3: HET and Capabilities

The development of HETs changes what humans are capable of; they give us new abilities and allow us to reach new levels in terms of our abilities. A central idea of the capabilities approach is that human capabilities can be developed and changed through the use of technology, HETs are developed specifically for this purpose. Because humans' natural abilities can be increased and developed through the use of a variety of technologies the impact of these technologies can be assessed through the capabilities approach.

Technology can alter the level to which capabilities can be attained. For example, humans' innate communication abilities only allow us to express basic needs and desires to others through methods such as crying, laughing, or making basic sounds. Nussbaum (1997, p. 289) refers to this kind of capability as a basic capability. However, this is not the full extent of our ability to communicate. As we grow we learn new methods of communication, such as using spoken and written language, to express more complex thoughts and emotions, developing what Nussbaum (1997, p. 289) calls 'internal capabilities'. Capabilities are not simply either achieved or not, but, rather, they can be achieved to varying degrees. An individual with only the communication methods they were born with can communicate to a much lower level than an individual who has been educated in written and spoken languages. A person who can use written and spoken languages has a greater capability for communication as they can share complex ideas with others, who also have this ability, over great distances in time and space. Capabilities exist on a spectrum. Humans are born with a set of capabilities, and, through learning and the use of technology, they are able to change their position on this spectrum.

The idea that technology can change capabilities is commonly considered in discussions of the

capabilities approach. Nussbaum (1997, p. 289-290) describes basic capabilities being developed by technology to form internal capabilities, before the environment is readied by the state for combined capabilities to become true possibilities. For example, an individual is born with a basic ability to communicate, through basic noises such as crying, laughing, or even smiling. This is then developed into a greater communication capability, through the use of technologies such as the internet or education in formal languages, to allow an individual to communicate much more effectively with others. Finally, this ability is turned into a combined capability, an individual's internal capability to achieve the functioning combined with the external conditions to make fully achieving this capability possible, such as ensuring that an individual is able to speak freely without fear of persecution. Sen gives the example of a bicycle as a technology that changes individuals' capability for movement (Sen, 1983, p. 160). Considering the use of technology altering individual's capabilities, specifically their internal capabilities, is clearly not controversial in discussions of the capabilities approach.

Technology alters what individuals are capable of. It does not simply allow people to get closer to the highest possible level of functioning in a certain area; its use expands the sphere of possible functioning, by raising the maximum level of potential functioning. Capabilities can be expanded both by natural maturation and learning, and also through changes in the material environment, such as mind tools that extend our thinking capabilities (Johnstone, 2007, p. 77-79). Technology can significantly alter the actions an individual can perform, and the kinds of outcomes he can create (Johnstone, 2007, p. 74). If the sphere of possible human capabilities was set by our nature, and technologies simply allowed us to reach different points within this sphere, this would require our innate capacity for communication to include the ability to communicate instantly with someone on the other side of the world, as the use of a phone or email does. However, this is not the case as doing so requires the use of technology in addition to our natural endowments, and, therefore, expands our natural sphere of communication capabilities. The ability to use a phone to talk

instantly with someone on the other side of the world added this capability to the sphere of human communication capabilities, rather than allowing us to obtain a functioning that already existed within our sphere of natural communication capabilities. Technology is developed to make it easier for people to complete necessary tasks, and to allow them to complete new tasks that were previously impossible, therefore, it is easy to see how technology can change individuals' capabilities.

HET encompasses all technologies that alter human capabilities; by definition, HET is technology that enhances what humans are able to do, that is, it enhances their capabilities. In the future, new HET will be developed that will have an even greater impact on people's capabilities. Although human communication abilities have already been extended with the development of written and spoken language, phones, and the internet, our ability to communicate is likely to be even further increased by future technology. For example, a direct computer-brain interface may allow individuals to access all of the abilities created by the internet, simply by thinking about it. An individual who can instantly communicate with another individual on the other side of the world simply by thinking about it, without the need to actively use an external device, will clearly have a greater ability to communicate than we have today.

Technologies such as calculators and computer programs provide additional examples of HET that alter capabilities. These devices allow individuals to calculate complex sums without sustaining mental strain, or having to obtain years of education, a clear increase in their capabilities. This is not a totally new change to our capabilities. Johnstone (2007, p. 79) argues that we extended our ability to do arithmetic with our fingers before we even developed the calculator, although use of a calculator allows us to manipulate much greater numbers than we can in our head or on our fingers. For example, a calculator allows individuals to solve mathematical equations easily, if I input "183 x 54 =" into a calculator I am presented instantly with the answer "9,882", without any serious

mental load on my part. I only need to know which buttons to press. Similarly, computer programs, such as Wolfram Alpha, a computational knowledge engine, allow individuals to obtain the answers to many complex problems without even knowing the formula needed. For example, typing “what is the diameter of a circle with a circumference of 98.7cm” into Wolfram Alpha instantly yields not only the answer “31.42cm”, but it also gives other information such as the circles radius and area. The ability to use technology such as Wolfram Alpha, or even a calculator, enhances individuals' cognitive abilities by assisting them to solve problems.

Deliberately inputting any information is likely to become unnecessary in the future as our use of the internet further increases. For example, with Google Glass, or direct computer-brain interfaces, it seems likely that an individual could simply look at a circle or equation and immediately be presented with the solution, and all the relevant information. This is obviously an increased ability compared to a human's natural ability, or even that of someone with the required maths skills. Being able to determine the solutions to these equations provides individuals with a great deal of useful information, however, having to calculate the answers manually requires years of schooling and even with the necessary skills it takes significant time and mental load to calculate the answers manually. The ability to use a calculator, or computer program, to assist an individual in solving these equations means that they can direct their mental load elsewhere, saving time and effort while obtaining accurate results.

Humans develop technology because it extends or expands our capabilities. Capabilities are open to change, they change as we grow and develop, but also as we are educated or use technology. We have already enhanced our capabilities through the use of technology, and we can be expected to continue to develop technology that alters what we are able to do. Future HET, like many existing technologies, will change what people are capable of; this is their purpose, why they were developed in the first place. Capabilities changing is an essential aspect of the capabilities approach,

and changing what people are capable of is an essential aspect of most technological developments, now, and in the future. Therefore, HET can be seen to alter humans' capabilities in a variety of ways. HET can increase individuals' abilities to achieve within a sphere of functioning by raising the maximum level to which the functioning can be achieved. Access to HET can greatly influence what individuals are capable of, therefore, it is reasonable to assess the application of the capabilities approach to states regulation of HET in order to prevent harmful inequality.

Chapter 4: HET and State Provision

HET do more than alter individuals' capabilities, they also change what individuals must be able to do in order to fully function in society. Individuals who can achieve all of the capabilities on Nussbaum's list of central capabilities should have everything required to pursue the lives they have reason to value and fully function as citizens. However, as technology changes the level to which these central capabilities can be achieved individuals becomes more reliant on these technologies to achieve their basic entitlements and be equal to others. In this way many HETs become essential to individuals' abilities to achieve the central capabilities to which they are entitled.

The central capabilities on Nussbaum's list are those that she argues are necessary for a life of human dignity, a life of value equal to that of all other humans (Nussbaum, 1997, p. 286). An individual, from any background or culture, who is able to achieve all of the central capabilities, will be able to pursue the life he has reason to value (Nussbaum, 1997, p. 286). Ensuring the capabilities on this list should be of central importance to the state as having these capabilities is an individual's basic entitlement. Therefore, in order to be considered just, a state must ensure its citizens are sufficiently able to achieve the central capabilities (those on Nussbaum's list), to ensure its citizens can function fully and equally as humans (Nussbaum, 2003, p. 36). What an individual needs to be able to do to function fully as a citizen varies between times and locations as technology and societies change. Thus, these changes also alter what a just state is required to ensure for its citizens. Central capabilities are those required for an individual to be a fully functioning member of society, and when the capabilities required to be a fully functioning member of society changes, so too does an individual's entitlement. Technology can change what is required for an individual to be considered equal to others, and for him to have the freedom to live the life he has reason to value.

HET have the potential to change human capabilities in a meaningful way; they can alter what it means for an individual to be a fully functioning member of society, and, thus, change what a just state is required to ensure to its citizens to secure their basic entitlements. For example, literacy has become so essential to an individual functioning in the developed world that illiterate individuals have significantly fewer opportunities than those who are literate. In our society, individuals must be able to read and write to get a job, secure housing, or communicate effectively with others. Literacy is clearly central to an individual's ability to function fully as a citizen². The ability to communicate individual's possess from birth is far less advanced than that which can be obtained through formal education in the use of languages. In this way, education in literacy can be considered an enhancement technology that alters a central capability individuals require to function in society, and, in turn, it must be ensured by a just state. Literacy has clearly changed what people are capable of, it has changed a central capability, and, thus, literacy is now a basic entitlement that all humans in developed states should have access to.

Similar changes have been caused by many other HETs throughout human history. For example, many HETs extend human life, and changes from these technologies alter human entitlements. Life expectancy rose greatly between 1950 and 2010, with global life expectancy reaching 68 years, a 21-year rise (Kondro, 2010, p. 342). Some theorists argue that in the future individuals will live longer, healthier, lives past 100, 200, or even 500 years due to developments in technology (Juengst et al, 2003, p. 28). These life extension technologies are constantly changing what it means to have the capability of living a life of normal length as they alter what it means for a life to be normal human length, and this can be expected to continue into the future. This is a clear example of how a HET has altered humans' central capabilities, and will continue to do so in the future. Individuals who lack the ability to live a life of similar length to others are likely to have less ability to succeed

² Although an illiterate individual may be able to achieve these things they require significant support from those who are literate, and, therefore, literacy is still essential for achieving these things – although an individual may not need to possess it himself if he can get help from another.

in society, for example they may be less able to pursue long-term career opportunities, or make the same family commitments, such as being married or around to support their children for as long, as others. Similarly, someone who could live a much longer life than others would have a much greater chance to succeed, and pursue the life they have reason to value. The capability for life and bodily health is essential to Nussbaum's list of central capabilities, and, thus, it seems clear that this is another example of a HET altering the central capabilities to which humans are entitled. The new life expectancy now becomes what individuals are entitled to, because the level of the central capability required to function fully in society, which we are entitled to, has changed, and, therefore, what a just state must ensure has also changed.

Because HETs can alter the central capabilities, to which all humans are entitled, they can also alter what a just state is required to ensure for its citizens. Education and formal language have greatly extended what can be expected from an individual in terms of her capability to communicate effectively with others. Similarly, life extension technologies have changed what it means for an individual to live a life of normal human length. Under the capabilities approach, for a state to be just it must actively ensure that its citizens have all the capabilities that are necessary to live lives of human dignity and respect, to fully participate as citizens and pursue the lives they have reason to value. Ensuring the central capabilities does not simply require a state to refrain from acting in a way that prevents its citizens achieving them, but, rather, it requires the state to act to actively ensure its citizens have everything required, internally, and externally, to achieve these functioning (Nussbaum, 1997, p. 190). Therefore, if a HET is necessary for an individual to achieve a central functioning to the level that can reasonably be expected for the state to ensure then the state is required to ensure the individual has access to this HET.

Nussbaum (1997, p. 290) focuses on a state's responsibility to ensure what she calls combined

capabilities, that is, the right internal states combined with appropriate external conditions that allow a person to achieve the functioning. However, this does not mean that she argues states are not equally required to also ensure an individual's internal capabilities. Appropriate external conditions and internal capabilities are equally important for individuals to be able to achieve combined capabilities. Even if a state secures individuals' rights to speak openly and freely without fear of persecution, this right is irrelevant without the internal capability to speak, or otherwise communicate effectively. Internal capabilities are those most relevant to discussions of HET, as HET alter what individuals are able to do. Thus, although Nussbaum argues that state policy should equally be aimed at ensuring the appropriate external conditions, in discussions of HET, considering the role of the state with regard to internal capabilities is much more relevant. For example, while Nussbaum focuses on the state's responsibility to ensure the appropriate external conditions for individuals to speak freely I focus more on the state's responsibility to ensure the means of speaking. This includes ensuring technologies such as education or the internet, as these are key to an individual's ability to communicate freely, alongside the appropriate external conditions that primarily concern Nussbaum.

It is the state's responsibility to ensure that both external conditions and internal capabilities are appropriate for individuals to be able to achieve the central capabilities they are entitled to. This means that an individual must have the physical and mental ability to achieve this capability, if it is reasonably possible, as well as the conditions in the external world being appropriate too. A focus simply on the external conditions would ignore some important differences between individuals. In the same way that providing all individuals with the same resources would not allow them to achieve the same valuable ends, simply ensuring that individuals live in the same external conditions is not sufficient to ensure that individuals are able to achieve the central capabilities. Differences between two individuals may mean that even if they are both in a society where the

right to free speech is protected, they may not both truly have the capability for speech. For example, if one is deaf or has a speech impediment she will have less capability for communication, if the state has not also focused on her internal capability, her ability to speak. My focus is not separate from Nussbaum's, as her interest in combined capabilities means that she is concerned both with the internal capabilities and with appropriate external conditions. However, my focus is almost solely on individuals internal capabilities (although I do acknowledge the importance of appropriate external conditions) as internal capabilities are those that are most directly influenced by HET.

HET changes individuals' potential for internal capabilities, and, thus, changes the state's responsibilities and requirements to fully ensure its citizens their central capabilities. In order to prevent harmful enhancement inequality it is the state's responsibility to ensure its citizens have the central capabilities to which they are entitled. The development of HET has seen some technologies become essential for an individual to function adequately in society. However, just as not all capabilities are essential to an individual's ability to function as a citizen, not all HETs are essential either, and only those that are essential must be ensured for a state to be just under the capabilities approach. By considering which HETs are essential for the central capabilities, those that allow an individual to fully function as a citizen and pursue the life they have reason to value, we can determine which HETs a just state must ensure to protect its citizens from harm and ensure their well-being.

The capabilities approach can also help determine to what level the capabilities must be ensured, and, therefore, specifically which HET must be ensured. Many HETs extend the level to which a capability can be achieved, however, it may not be necessary for an individual to function to this level, and, thus, a state would not be required to ensure this HET. Although all central capabilities must be ensured to all individuals, to fully function as a citizen an individual may not need to

achieve all of these capabilities to the maximum possible level. A HET may only increase an individual's ability to achieve a capability to levels above those required to function as a citizen. In this situation, the state would not be expected to ensure their citizens the HET, even though it altered their ability to achieve a central capability, as it did not do so in a way that caused those without access to be less able to function as citizens and achieve the life they have reason to value. It is unrealistic to expect all states to ensure all central capabilities to their citizens to the highest possible level, and, if judged this way, many, if not all, states would fail to be considered just. Although it may be possible for an individual to have a capability to a very high level, it may not be necessary for the state to aim to ensure this level to its citizens if they do not need to achieve the capability to this level to fully function.

For example, the capability of life can be achieved to many different levels, and it would be ridiculous to judge a state on its success at ensuring all of its citizens lived as long as the oldest recorded person. This is not what is required for a just state to ensure its citizens the capability of life; for a state to be considered just it must ensure its citizens live as long as reasonably possible. This does not mean providing everyone with the same health care, as individual differences and luck mean that to achieve the same outcome individuals require different resources. It also does not mean that a state has failed at being just if, despite its best efforts, an individual dies of cancer at age 12, without having the capability to live a life of normal human length. Nor does it mean that a just state may remove medical treatment from an individual against her will once she has reached a certain age, determined as that of a normal life. Rather, it means that a state should do what it reasonably can to ensure the life of its citizens, which includes ensuring any necessary HET are available to its citizens. For a state to be considered just it should, if it has the ability, extend human life as much as it reasonably can, providing that staying alive and the use of the technology are wanted by the individual.

To summarise, with the development of technology humans' abilities are changing, for example, variations in technology between times and locations means that the capability for a life of 'normal human length' is constantly changing, and, thus, what states must ensure varies depending on the medical technology available at that time and location. States must provide HET in the form of medical technology for the purposes of ensuring their citizens' capabilities for life, they must do this to the highest level that is reasonably possible for that state. What this level is will vary between different states even within a specific time. A wealthy state with a large quantity of resources to direct towards health care can be expected to ensure the capability of life to a much higher level than a poor state with only minimal resources. If both of these states manage to ensure life to the same level the poor state may be considered to be doing very well, while the wealthy state could be considered to be unjust due to failing to ensure this essential capability to the maximum level it is reasonably able.

Due to the changes to central capabilities expected from HET, states will be required to ensure their citizens have access to some of these technologies in order to ensure they can achieve the capabilities they are entitled to under the capabilities approach. In order to be considered just states need not ensure all HET, or even all those necessary for the central capabilities. However, they must ensure the centrally important capabilities (those included on Nussbaum's list) to their citizens to the best of their ability to ensure that their citizens are at least minimally able to function in society as equals, at times this will require ensuring relevant HET. What it means to sufficiently ensure a capability will vary between states due to their differing circumstances, therefore, even if one state can be expected to ensure a specific HET this does not necessarily mean that another state should be expected to do the same. Simply because a HET increases a central capability does not mean that all states must ensure it to be considered just, but it does require those states that are reasonably able to

ensure it for their citizens if it is required for them to sufficiently function in society. The capabilities approach allows us to judge the justness of a state by considering whether it has sufficiently ensured all of its citizens their basic entitlements, the central capabilities. This will sometimes require states to ensure their citizens have access to a HET, due to its impact on individuals' central capabilities.

Chapter 5: Education

Formal education is necessary for individuals to function in society, it provides many essential skills people require, but without state provision it would be unavailable to many. States have a responsibility to ensure their citizens have the ability to function in society, and at times this will require ensuring they have access to essential HETs. For example, we already expect a just state to ensure education to its citizens because it provides individuals with essential skills that are necessary for them to have the opportunity for well-being. Without formal education many individuals would lack the ability to function productively as citizens, therefore, states must ensure formal education is available to all of their citizens in order to mitigate inequality. Education can be viewed as an example of a HET that states must ensure if they are to be just.

An enhancement can be defined as something that increases or improves a person's abilities in quality, value, or extent. Education provides individuals with new capabilities, such as the ability to write. It can also increase the value of these capabilities by providing a wide range of people the same ability. For example the ability to read and write increases in value as more individuals also have this ability because it allows individuals to communicate with each other in much more productive ways. Basic literacy is a valuable skill, based on the fact that others also possess this skill. If you are the only literate individual your capability to communicate has not been increased at all; at least one other individual would also need this ability for it to be of any use to either of you. The benefits of this ability increase as more people become literate as you are now able to communicate with a whole range of people. Therefore, education should be considered a human enhancement technology as it enhances individuals' opportunities for well-being.

Education provides many skills that would be difficult or impossible for an individual to develop on

his own, such as reading, writing, or mathematics. Although a child could develop his own language without education, this is not the same as being educated in the predominant language of his society as the more common language would allow him to communicate more effectively with others, rather than his language which allows him to only communicate with himself. If we consider two individuals, one who has been taught how to read and write in the common language of his state and another who has not, it is clear that the first individual, who is literate, is more able to communicate with others than the illiterate individual. A literate individual has the ability to pursue a variety of careers, communicate effectively with others, seek higher education, and gain more knowledge, while the illiterate individual is severely restricted in vocational opportunities as well as his ability to communicate with others and access information. The literate individual is more able to function in central ways than the illiterate individual and, therefore, has greater opportunity for well-being, even if he chooses to never utilize this ability.

In the past, any information had to be passed directly from one individual to another through spoken word, which had the potential to create a Chinese whispers effect (where meaning is lost through a series of small inaccuracies when relaying information between a large group of people). Now, with the use of written language, information can be passed accurately over time and space. The ability to write allows individuals to pass their thoughts on to others without necessarily being directly in front of them, this increases clarity and prevents errors as well as increasing the speed of communication over long distances. The ability to read allows individuals to 'hear' what these writers have to say without relying on someone speaking the words to them. Without my ability to write, and your ability to read, I would be unable to communicate my ideas with you now. I would be required to either speak them directly to you, or have someone recite my words from memory to you, neither of which seems as effective, or beneficial, as this method of written language. Similarly, without the ability to read an individual is unable to read instructions or learn information from books. Having these abilities is obviously beneficial and allows individuals much greater

communication abilities.

Education takes on many forms, it can involve learning from parents, peers, other humans, other animals, or even the environment. Being educated and learning new things is something that humans are naturally capable of, we are able to mimic, and learn through conditioning, right from birth. Although there are many kinds of education, for the purposes of this example I will be considering formal education, that is, an individual receiving systematic instruction with the goal of the individual learning a new skill, or improving those they already possess (specifically in schools rather than what individuals may learn at home from their parents or family members). Education's ability to enhance and increase our capabilities means that it perfectly suits the definition of a HET, its purpose is to enhance what we are able to do. For example, education in literacy greatly increases our communication abilities, and education can also reduce our mental load by providing us with mental software that allows us to complete tasks with less effort (Sandberg and Bostrom, 2007, p. 208).

Because of its clear benefits education is widely valued and rates of participation are rising across western nations, with an estimated 84% of individuals from OECD nations completing upper secondary school education, and rates of university education increasing 25% between 1995 and 2010 (Bessant, 2013, p. 138). Traditionally, education's value, and justification for state provision, stems from its ability to produce skilled employees for the labour market, who then go on to earn higher incomes, and gain the associated increased living standards, as well as promoting economic growth for the whole society (Bessant, 2013, p. 138). For example, in Australia an individual with a university degree can expect to earn significantly more than an individual who has failed to complete year 12 (Bessant, 2013, p. 141). States are expected to ensure education is available to all of their citizens, in order to ensure they all have an equal opportunity to achieve the associated economic rewards that in turn promise increased living standards. Because of the essential benefits

it provides, basic education is held as a universal human right. Article 26 of the Universal Declaration of Human Rights (1948) holds that free education, at least in the elementary and fundamental stages, is a human right, and that higher education must also be made available to all individuals.

Although provision of education driven by the promise of economic productivity can promote instrumental skills it also has the potential to leave behind the most vulnerable and disadvantaged in society (Cockerill, 2014, p. 13). Having goods does not necessarily mean an individual will be able to achieve the valuable outcomes they are meant to ensure, such as health, social relationships, or freedom (Bessant, 2013, p. 142). Ensuring resources is not guaranteed to ensure well-being. Although education may be essential for individuals to gain the skills necessary to achieve fulfilling employment, the economic rewards associated with this employment are not a sufficient measure of well-being and should not be considered sufficient justification for state provision. Therefore, if a state's success in ensuring education for its citizens is measured by whether its citizens are able to achieve employment in order to purchase essential resources, then a state measured as successful may not actually have ensured the well-being of its citizens. Rather, states motivation for ensuring education should be due to its necessity for ensuring their citizens have the central capabilities to which they are entitled, which at times require education in order to be fully realized.

The capabilities approach, when applied to education, illuminates where the real benefits from education lie, that is, in creating opportunities for individuals to achieve well-being, defined as achieving certain functionings. This challenges the traditional income generation approach to education. Instead of the goals and value of education being seen as income generation or employability, the capabilities approach values education for its ability to expand human capabilities and allow individuals to lead more worthwhile and free lives (Walker, 2005, p. 104). Education is essential for individuals' abilities to achieve well-being. It plays an essential role in

developing and expanding capabilities, and expands individuals' opportunities. Education provides individuals with some capabilities that they require to develop further capabilities necessary to pursue the life of their choice. For example, developing basic, then advanced, maths skills opens a range of career possibilities to individuals, which in turn expands the opportunities individuals have to pursue the life they have reason to value (Walker, 2005, p. 107-108). Education also teaches individuals important values and assists them in forming their identity and determining the kind of life they will value, and, therefore, use their capabilities to pursue (Walker, 2005, p. 108). Education is essential in order for individuals to develop their central capabilities of practical reason and affiliation, to develop a conception of the good, and determine what is meant by the good life they have reason to value (Cockerill, 2014, p. 14). Ideally education will equip individuals with many of the capabilities necessary to determine, and pursue, the opportunities, and lives, they value (Walker, 2005, p. 109). These are the reasons that education should truly be valued, rather than under the traditional income generation approach that fails to ensure well-being.

Although the value of education is clear under the capabilities approach, without state involvement many individuals will lack the ability to achieve these essential benefits from education. Without the availability of a formal education system individuals rely on their elders to educate them in the skills they will need for participation in society. This means that an individual's education potential is bound by the educational attainment of her elders, generally her parents. For example, if a child's parents lack the skills of literacy it is highly unlikely that the child will be able to attain these skills without outside schooling. However, this outside schooling can be costly and, thus, would only be available to children of parents with the financial means necessary.

Problems arise when educational attainment is required for an individual to attain the higher paying employment that would provide them with the financial means to educate their children. This means that parents who are unable to afford to send their children to school are also unlikely to be able to

educate them themselves, because if they had the literacy to pass on to their children they would likely be able to achieve the higher paying employment it promises, and, in turn, pay for their children to attend school. Therefore, without state funded education, the children of poor parents can be expected to miss out on the education necessary to pursue better employment, and, therefore, will also not be able to afford to educate their own children, who again will be in the same position as their parents before them. On the other hand, the parents who are educated can afford to send their children to school, who can then expect to attain the benefits education promises, and go on to educate their own children. The expected result is a nearly inescapable cycle of inequality, children of wealthy parents will become educated and have the opportunity to achieve high paying positions, while children of poor parents will lack these opportunities, through no fault of their own perpetuating the cycle of inequality.

Therefore, a lack of state funded education leads to inescapable inequality, with hardly any chance of social mobility as the poor lack the basic skills that an education would provide and are necessary to move out of poverty. If education is only available to those who can afford it by their own means, or that of their parents, there will be some individuals who miss out, due to luck of birth. Some children will grow up lacking basic skills as they were born to parents who could not afford the necessary education. This will greatly hamper their ability to live lives equal to that of other citizens as they lack the necessary skills to compete in the employment market.

An adequate education promises the possibility of a better income, more job options, and the possibility of higher education. Although these benefits are only instrumental for achieving well-being, rather than being viewed as well-being themselves as they are in the traditional model, they are an essential aspect of a full human life that a state must ensure in order to be just. Due to the essential nature of basic education, citizens require it to make central capabilities a possibility and pursue the life they have reason to value. However, if it is left to individuals to ensure it for

themselves and their children some will miss out, due to luck of birth. This will cause great harm not only to the individuals, but to society itself due to increased inequality. Therefore, states must act to ensure all of their citizens are able to attain basic educational achievement and access the capabilities that are essential to their lives as humans in society. At least some education is crucial for all humans under the capability approach due to its necessity for individuals to be able to fully function as members of society and pursue the lives they have reason to value with dignity equal to that of other humans.

Education is clearly a HET, it obviously changes what people are capable of. It is essential for individuals to gain the skills required to fully function as citizens in most societies and achieve their central capabilities. However, if access to education is left within the free-market, great inescapable inequality will rule. In order to avoid this harmful inequality, states are required to ensure their citizens have access to education, because basic education allows individuals to achieve many of the capabilities central to a life of human dignity equal to that of others. States are already expected to ensure their citizens have access to education, and states that fail to do so are unjust under the capabilities approach as education is central to an individual's ability to function with human dignity and achieve well-being. Therefore, education can clearly be viewed as an example of a HET that just states are already expected to ensure in order to secure their citizens the central capabilities to which they are entitled.

Chapter 6: The Internet

Another technology that hugely increases human capabilities is the internet, its use allows us to achieve things that would otherwise be impossible. Although the internet already exists, it is not yet widely considered a basic human entitlement that states must ensure if they are to be just. However, the internet is a technology that dramatically alters what individuals are capable of, and it may be essential for states to ensure it to their citizens if it is necessary for individuals to function adequately in those states. If it is necessary for central capabilities, the capabilities approach would require states to ensure their citizens have access to the internet. Therefore, this chapter will explore whether the internet indeed alters individuals' capabilities in such a way that just states should be required to ensure it for their citizens.

The internet is a global network of interconnected computers that holds a variety of information and communication facilities that individuals can access through connected devices. Until recently the only way for an individual to access the internet was through a desktop computer physically plugged into the network. Now, with wireless capabilities, individuals can connect from a range of devices almost anywhere. Today many individuals even possess a small computer in the form of a 'smart phone' that they carry on them at all times and can use to access the internet instantly. New and developing technologies will allow individuals even more ubiquitous access to the internet, and all the information and communication it allows. For example, Google Glass is a wearable, head-mounted computer with an optical display that provides the individual who wears it with hands-free access to the internet. In the future, devices may be developed that directly link individuals' brains with the internet, allowing them to access all it has to offer without the need of an external device; such a direct brain-computer interface could allow an individual to access the internet by simply thinking about it. As internet connections become more integrated with individuals, the ease of

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access to all of the associated benefits is constantly expanding. Rather than sitting at a fixed console individuals now can access the internet instantly from almost anywhere.

The internet can alter what individuals require to achieve a number of central capabilities. For example, the internet has a significant impact on an individual's ability to control her environment, both material and political. An individual with access to the internet has a more effective method of communication than someone without, they can communicate with a much wider audience and with a level of anonymity that seems unachievable elsewhere. Understandably the internet is becoming the preferred method for political participation, as well as education, employment, commerce, and personal activity (Tully, 2014, p. 176). The internet also increases an individual's ability to control her material environment, including by increasing her purchasing power and ability to seek employment.

For example, online job applications are becoming mainstream with employers claiming that it increases the speed with which they can find a suitable applicant to fill the position (Raman, 2006). Online applications also increase opportunities for employees by opening more possibilities of seeking employment internationally (Raman, 2006). Access to the internet also increases an individual's purchasing power as he is able to view products available from a huge range of suppliers and compare costs from the comfort of his own home. Products purchased online can be expected to cost less as the retailer has fewer costs related to physical retail locations or sales staff, and there is increased competition between retailers, causing their products to be advertised at more competitive prices. Therefore, not only does access to the internet increase an individual's control over his political environment by providing improved methods of free speech, but it also increases his control over his material environment by allowing greater opportunities to gain employment, and, further, increasing his purchasing power from the financial rewards gained through this employment.

Another central capability that the internet has a significant impact on is affiliation. The ability to affiliate, interact socially, as well as assemble and speak freely, to an equal degree as others is an important aspect of living a fulfilled human life. Nussbaum's (1997, p. 287) focus on affiliation is in terms of individuals having the ability to develop meaningful friendships, as well as the state protecting the freedoms of assembly and political speech. Affiliation also includes the social basis for self-respect and non-humiliation, and to be treated as a human whose worth is equal to that of others (Nussbaum, 1997, p. 287). Clearly, the internet is, at least in current developed nations, becoming essential to adequately achieve the capability of affiliation. As I have already established the internet is becoming an important tool for free speech, but the internet also allows individuals to affiliate and develop meaningful relationships with other individuals. The internet allows individuals to be friends with a much larger group of people, and connect with their current friends in more ways, such as through social media websites. For example, 73% of online adults use social networking, with Facebook being the site of choice (Duggan and Smith, 2013). The ability to use these online methods of affiliation clearly contributes to an individual being equally able to achieve this central capability, with dignity and respect similar to that of others.

Another capability that Nussbaum (1997, p. 288) argues is central to an individual's ability to function as a human equal to that of others is play. The capability to play involves an individual being able to laugh, play, and enjoy recreational activities. Similarly to other capabilities, an individual needs to be able to achieve this capability to comparable levels to that of others. The internet impacts this capability by opening the door to a variety of new ways to play; online games are becoming increasingly popular and allow individuals a new means of social interaction or personal entertainment. Half of Americans over the age of 6 play video games (ESA, 2005), thus it is clearly an important aspect of normal play in current society. This is a further example of how the internet is clearly necessary for individuals to participate equally in society and achieve the central

capabilities to which they are entitled.

An individual with access to the internet has many more capabilities than she would otherwise possess. It increases the control she can hold over her political and material environments while also being essential for individuals in developed nations to participate in normal affiliation and play. Due to the vast array of benefits it offers it is clear that an individual without access to the internet is severely limited compared to an individual who does have access. Due to its ability to enhance what humans are able to do it seems clear that the internet is a HET. The internet is currently an external device, but in chapter 1 I explained that many HETs are not directly or permanently linked to individuals, such as reading glasses, but are nonetheless HET due to their ability to increase or improve human abilities. However, if someone remains unconvinced that the internet deserves its status as a HET they need only consider a computer chip that if implanted into a brain allowed that individual to directly connect his brain with the internet and gain its benefits without actively using any external devices. This internet chip would be a fully integrated, non-removable enhancement that obviously fits the definition of HET as it increases individuals' capabilities.

As I argued in chapter 4, for a technology to be an entitlement that states must ensure for their citizens, that technology must do more than just enhance human capabilities, it must be required for the central capabilities that humans are entitled to. This could be the case for the internet. The functionings that access to the internet allows individuals to attain are such that, at least in many societies, those without the ability to achieve them are less able to function as members of society. An individual without access to the internet cannot obtain information or communicate as a fully participating citizen in society, nor is she able to participate in everyday activities as an equal citizen (Tully, 2014, p. 177). This is exactly the kind of inequality the capabilities approach is designed to prevent, and, thus, states may need to seriously consider the internet's position as an entitlement.

Clearly, the internet is necessary for a range of central capabilities that all humans have an entitlement to. However, this does not necessarily mean that a state is unjust if they have not ensured their citizens have access to the internet. Although capabilities can be achieved to a variety of levels, states are not required to ensure their citizens can achieve all capabilities to the maximum possible level to be considered minimally just. Rather, the capabilities approach only requires the state to ensure them to the highest level reasonably possible (Nussbaum, 2011, p. 27). This could make it difficult to judge the justness of a state as it could claim it was ensuring a capability to the best of its ability while only allowing citizens to achieve this capability to a relatively low level that did not allow its citizens to actually achieve much in the way of functionings. However, as discussed in chapter 2, the intention of the capabilities approach's requirement of justice is to ensure a state is just by requiring it to ensure the central capabilities to at least a minimum level that allows individuals to participate equally and adequately in society. In the case of the internet this would require some states to ensure it to their citizens as it is essential for individuals to even have a chance at functioning adequately as citizens, and achieving the life they have reason to value.

The internet is not a new technology, and I am not arguing that from its very conception it was an entitlement of every citizen, I am not even arguing that it is an entitlement of every citizen in every country now. Rather, the internet can be seen as resting on the very cusp of entitlement. It could be argued that in current western society, for example New Zealand, some degree of internet access must be ensured if the state is to be just. Although it may only be at low levels such as availability in public libraries, where those who cannot afford their own computer and connection can use this valuable service for their basic internet needs. This was declared the case by Estonia in 2000 when they determined that internet access was a human right, although the practical entitlement only extends to free access in public libraries (Tully, 2014, p. 178). In 2010 Finland also declared that broadband internet was a legal right of their citizens, they went further than Estonia however, and

vowed that everyone would have a 100Mbps connection by 2015 (BBC News, 2010). The British government also agreed that it was important to provide everyone with a broadband connection (BBC News, 2010). This clearly shows that there is already widespread support for consideration of the internet as an essential technology.

In a future society where internet chips, that allow an individual to directly connect her brain to the internet, are common place it may be unacceptable for society's poorest to be forced to access the internet only through the public library system. An internet chip would allow users to directly connect their brains to the internet, meaning that they would be able to send emails, instant message, access information, compute complex equations, and have many other valuable abilities instantly without an external device. An individual without access to this internet chip would be at a significant disadvantage. Even if she could access the internet through a public library she is likely to be unable to function adequately as a citizen as her capabilities would be so significantly less than that of an individual with the chip implanted. This change could force countries like Estonia to extend their commitment to ensuring the internet is available beyond the library and into the homes, and potentially even brains, of individual citizens.

Serious, inescapable, inequality where some individuals are unable to achieve essential capabilities is unacceptable. Just states must ensure that their citizens have the capabilities necessary for them to fully function as citizens. Some of these capabilities require access to certain technologies and the internet is one of them. Without state intervention, access to the internet can be expected to be unevenly distributed based on an individual's ability to pay. This is already the case; although internet use is widespread, with the number of internet users worldwide increasing from 10 million in 1993 to over 2 billion today, this growth is unequal (Tully, 2014, p. 188). Over 70% of inhabitants of developed states are internet users, compared with just over 20% of citizens in developing states, and fewer than 10% of individuals in Africa (Tully, 2014, p. 188). Internet access

is also concentrated among socio-economic elites within these different states (Tully, 2014, p. 189). Inequality of access to the internet is associated with unacceptable inequality of central capabilities due to the internet's ability to significantly alter what individuals are capable of. Therefore, although internet use is widespread it seems that states may have a further responsibility to ensure its availability to all, including their poorest citizens, due to the importance of internet access to individuals achieving their basic entitlements as citizens.

The capabilities approach does not deal in absolutes in terms of state provision, states are required to ensure their citizens have the central capabilities to the best of their ability. But, it is intended that the central capabilities be ensured to a level that allows all individuals to fully function as citizens in that society. This means that because some technology is required for an individual to fully function as a citizen, as is becoming the case for the internet, for a state to be just it must ensure this technology for its citizens. The internet is a HET that alters individuals' central capabilities in a way that means that those without access are unable to live fully functioning, equal, lives, and, thus, the state must ensure all citizens have access to the internet. The conclusion that a just state must ensure that its citizens have access to the internet, to a level that allows them to equally function as citizens, is another example of how HET can change central capabilities in a way that warrants state provision of the technology.

Chapter 7: Life Extension

Life extension technologies (LET) alter how long individuals can expect to live, and, consequently, the life span states can be expected to ensure for their citizens. Under the capabilities approach all humans have the entitlement to live a life of normal human length. However, 'Normal human length' does not refer to average life expectancy; rather, states must ensure that their citizens can live as long as reasonably possible. Although individual differences will make it impossible for states to justly ensure that all citizens can live the same length of time, they are still required to do everything reasonably possible to ensure their citizens' lives are not cut unjustly short. With the development of new HETs that can greatly increase individuals' potential life spans the technologies that states must ensure to their citizens changes.

LET encompasses all technologies that are aimed at extending the life of humans beyond the 'normal' range. Most medical treatments can be considered LETs as they are developed with the goal of prolonging human life. Further techniques for extending life are constantly being developed. For example, researchers are currently developing a custom membrane that would fit over a human heart, like a glove, and prevent heart attacks (Gorman, 2014). According to the American Centre for Disease control heart disease was the leading cause of death in America in 2010, causing over 590,000 deaths. A device that could prevent heart attacks and keep hearts beating could allow many individuals to live much longer lives (Murphy et al, 2013). Another variety of technologies also fits within this category; LETs are being developed that aim to prolong life by reducing the effects of ageing, rather than combating a specific disease. For example, a study found that removing the pain receptor in mice and roundworms extended their lifespan by about 10%, and it is hoped that similar results could be obtained for humans in the future, without the necessity of removing pain receptors (WWC, 2014).

LETs not only focus on extending human life but also improving the quality of human life. It is unlikely that many people would be interested in living to 500 if they would be in a seriously deteriorated condition for the majority of this time. If people aged 'normally' until 100 and then continued in the condition of a 100 year old today for the next 400 years, this is unlikely to hold mass appeal, nor provide the benefits imagined when one considers having one's life extended. Because of this, a vast quantity of research is being conducted into extending individuals' most productive years, opening the possibility of an individual living with the vitality of a 20 year old for well over 100 years. A recent study on mice claims to have successfully reversed ageing, and the researchers are confident in the ability of the same technique to be applied to humans in the future (Savastio, 2014). They claim that if the same results could be replicated in humans, it would be like a 60 year old feeling similar to, and having the muscle tone and energy of, a 20 year old (Savastio, 2014). If a technology was developed that allowed an individual to live with the physical and mental capacities of a 20 year old for over 100 years, this is likely to give this individual benefits over his peers as he would have significantly more time to succeed at his life goals and pursue the life he has reason to value.

Regardless of whether living a longer life is a genuine advantage, although it seems that it would be, the changes LET can be expected to make to life expectancy make them of specific concern to any state, under the capabilities approach. One of the central capabilities is life; for an individual to have this capability they must be able to live a life of normal human length, without dying prematurely or having their life so reduced that it is not worth living (Nussbaum, 1997, p. 287). Living a life of normal human length does not mean that all individuals must live an average life span for a state to be just, as this is simply not always possible. Nor does it mean that the state can remove medical treatment from an individual once they have reached the age of average lifespan. What is required for a state to be just, in terms of ensuring the capability of life, is that it, to the best

of its ability, ensures its citizens do not die from something that could reasonably be prevented from killing them.

The invention of many healthcare technologies has meant that many conditions that in the past were expected to kill you are now easily treated. For example, the development of antibiotics gave individuals a greater capability to fight bacterial infections. Prior to the development of antibiotics and other modern healthcare techniques, tuberculosis (TB) was almost always fatal, however, the fatality rates have dramatically dropped to about 4% as of 2008 (Lawn and Zumla, 2011, p 67). Prior to these developments it would not be expected for someone to survive TB, it would not be a central capability that someone should have, while today it certainly is. We now have the ability to effectively treat TB, and would believe that someone had not been able to adequately achieve their capability for life (not dying prematurely) if they had been killed by untreated TB. In the future it is likely that an increasing number of diseases and conditions that are currently untreatable will be able to be easily combated with new technological developments. A cure or vaccination for HIV or a cure for 'old age' could both dramatically alter what would be considered having the capability for life. These developments would again change what it means to live a life of normal length. Therefore, their development would also alter what a just state is expected to ensure in terms of protecting its citizens' entitlement to live a life of normal human length.

Although the central capability of life on Nussbaum's list refers to a life of 'normal human length', seemingly talking about average life expectancy, this does not mean states do not need to ensure LETs unless they are necessary for a citizen to live a life of average length. They could be required even if they are only useful at extending life beyond average length. In 2004 life expectancy in the United States was estimated to be 77.8 years, whereas the maximum life span, the highest verified age, stood in 2009 at just over 122 years for females and 116 for males (Sierra et al, 2009, p. 458).

Life expectancy has increased continually and linearly between 1840 and present, rising about 3 months per year, or 2.5 years per decade (Sierra et al, 2009, p. 458). But powerful LETs could change life spans without changing average life expectancy if they were only available to a minority. The rich elite could extend their own life span without having much of an impact on overall life expectancy. If a LET was developed that allowed some individuals to live significantly longer, healthier, lives than an average citizen (as only a minority could access them due to their prohibitive cost), then this would be expected to create significantly harmful inequalities and force the state into action. Therefore, changes from LET do not need to cause changes in average life expectancy for the state to be required to ensure them. As discussed in chapter 2, the state must ensure individuals' capabilities are such that they allow each individual to fully function as a member of society and have the equal ability to pursue the life he has reason to value. This may require providing technologies that increase individuals' capabilities beyond the average range if extension into this higher level was required for an individual to have an equal chance at competing in society, to be able to pursue the life she has reason to value, or hold equal political and social power.

Even if LETs only impact the maximum life span of some individuals, this could still significantly reduce the capabilities of those without access to this technology. This is because LETs have the potential to dramatically alter the structure of our society. They could create a world where the family systems and transitions of power we know today are non-existent. For example, if individuals with access to LET can expect to live to over 200 years there is no reason for them to let go of their positions of power and retire at 65, or even 80. If people start retiring at much older ages, this is likely to alter the pacing of promotion with the importance of seniority (Sierra, 2009, p.466), and, thus, those without access to LET can expect to miss out on important career opportunities as they will lack the ability to achieve the age, and associated experience, necessary to achieve these

promotions. An individual who has the kind of hugely extended life expectancy that LET offers can obviously achieve more things in his lifetime than an individual with a 'natural' life expectancy, of, say, 80. Individuals with extended life expectancies are likely to be able to pursue many more careers, and get further within these careers, in their lifetime, and generally have more time to pursue lives they have reason to value.

An individual with access to LET has many more capabilities than someone without access, as such they can be seen to have a significant advantage over those without access to LET. An individual without access to LET would not be equally able to function. He could not be reasonably expected to be able to live a life of equal dignity, nor fully function as a citizen, if by the time he reached 80 years he was resigned to a life of the elderly without the ability to work and with the knowledge that he would soon die, when his peers, with access to the technology, have not even reached middle age and are only now beginning to start their families and build their careers. This is serious inequality that can be expected to be harmful for everyone in society, and it is clearly the job of states to ensure all of their citizens have the equal capability to live a life of dignity equal to that of others. With the development of powerful LET this will require some states to ensure their citizens have access to this technology.

This chapter provides an example of how in the future a HET could create such a huge change in individuals' capabilities that those without access will not have even the slightest chance to compete with those who have access. In this case it would be absolutely essential for any remotely just state to ensure all of its citizens have access to this technology. The examples covered prior to this chapter are technologies that already exist, LET is not significantly different as technologies that aim to extend human life have been around for most of human history. LET have huge potential to enhance humans' capabilities for life, this chapter specifically focused on the LETs that are aimed

not at allowing humans to live a life of normal human length, but rather those that allow individuals to live beyond even the maximum length of life humans can currently be expected to achieve. Given this, it is clear that the capabilities approach would require states to ensure that their citizens can access LET in order to adequately achieve the essential capability of life. However, this chapter also gives an example of how, in some cases, states cannot afford to wait until the norm is changed to ensure a technology as harm can be caused even when only a minority have access to a technology. Therefore, the state must act not simply to ensure its citizens have a 'normal' or 'average' capability, but to ensure that they are able to achieve all central functionings to a level that allows them to fully participate in society and pursue the life they have reason to value with human dignity and respect. With the development of LET there is the serious possibility that if access is left unregulated in the free market, an individual's life span could be based on ability to pay. Clearly states will need to ensure their citizens have access to these LETs, including before they are widespread enough to alter average life expectancy. Although Nussbaum argues that none of the central capabilities are more important than the others, the capability of life is the most essential as without it none of the others are even possible. LET is important to consider as it is a technology that will cause great changes to individuals' capabilities in a way that will require states to ensure this technology to their citizens.

Chapter 8: Genetic Modification

The impact of Genetic Modification (GM) on human capabilities and future societies is difficult, if not impossible, to predict, but developments in GM may change the requirements of a just state. Therefore, GM is an ideal example for considering the ability of the capabilities approach to cope with the unpredictable nature of future HETs, and to continue providing constructive policy guidelines for any HETs developed in future.

Genetic modification (GM) refers the intentional alteration of an organism's genes. GM has the potential to make humans super strong or hyper intelligent. It could extend all human senses or give us new ones. It could make humans glow-in-the-dark or change our basic requirements for life. GM even has the potential to create new people who hardly resemble Homo sapiens at all. GM could involve combining human genes with those of other animals, or even plants, to create a human with an animal's abilities or traits. It could also involve altering human genes in order to give some kind of benefit to that human, such as removing vulnerability to a certain condition or disease. With GM, no human trait needs to be regarded as essential due to it simply being a 'human' trait. This opens a whole new realm of capabilities. No longer are our abilities defined or constrained by our species, but, rather, our abilities become almost totally open to change. Clearly GM is a HET due to its potential to greatly expand human capabilities.

The ability to select between embryos for traits such as intelligence is already being developed (Guilford, 2014), and it hardly seems a leap to imagine developing the ability to genetically modify an embryo to create an intelligent child. GM also has the potential to provide individuals with other advantages, such as immunity to disorders or diseases, or the ability to regrow limbs like starfish. The significant potential changes to our abilities from GM mean that it could allow us to achieve

any number of benefits. This could range from simply increasing our current abilities, such as through increased intelligence or physical strength, through to providing us with traits that naturally only belong to other species. Because the most influential GMs are unlikely to reach the stage of being used on humans in the near future, as they are yet to reach even the initial experimental stages, and because the variety of outcomes from this technology are so large, it is extremely hard to predict what kind of changes may occur to our capabilities. However, we can expect some fairly general results, for example we can expect GM to greatly increase many of our already existing capabilities, and we can also expect it to allow us to achieve new capabilities.

Just as the genetic changes that may be possible with GM are hard to predict, so too it is hard to predict what kinds of capabilities will be necessary, that is, central to human life, in the future. Although the ability to glow-in-the-dark or regrow limbs is not necessary for most individuals to be able to achieve the central capabilities now, and it may be hard to see how it would be necessary in a future society, this is something that is almost impossible to predict. For example, in the past, long before written language, it would be impossible to understand why someone would need to be able to read or write, let alone have a computer to send emails and talk to others on the other side of the planet instantly. However, as I have shown, we certainly need these capabilities now. For the capabilities approach to be useful at providing policy recommendations for these future societies, it must be able to apply to any possible developments, including ones we are yet unable to predict.

Future societies are hard to predict, but general approaches can transfer to these societies, and, thus, we can anticipate in a very general way what states will be required to do in order to be just. Almost any of the changes possible through GM or other HET could be essential for an individual to function in a future society, and those that are essential will be necessary for a state to ensure to its citizens. If it were the case that the ability to glow-in-the-dark was necessary for basic functioning as a human in society, then we know from the capabilities approach that a just state must ensure this

genetic modification was available to all of its citizens. These basic principles of the capabilities approach can apply to all future developments of HET, regardless of how difficult they are to predict. If a technology were developed that altered humans' capabilities in any way that changed what was necessary for an individual to function fully and equally as a citizen, then a just state would be required to ensure this technology to the highest level reasonably possible, regardless of what it was or what specific changes it made to human capabilities. On the other hand, the capabilities approach can also tell us which technologies are unnecessary for the state to ensure to its citizens; if a technology was not necessary for an individual to fully function as a citizen and pursue the life he has reason to value, then the state would not be required to ensure its availability, no matter what kind of technology it was, or what changes it made to capabilities.

Some HETs, such as GM that significantly alters our genetic structure, may raise the question of what it means for someone to be human. The capabilities approach was developed to cope with 'human' capabilities, but the use of some HETs may make an individual seem other than human, and, thus, they may threaten the applicability of the capabilities approach in regards to this individual. However, this would not have a serious impact on my conclusions. This thesis uses the term 'human' in a broad sense. A definition such as that developed by Martha Nussbaum in her discussion of the capabilities approach may suffice. She argues that for the purposes of the capabilities approach, a human is anyone who is born to human parents and who has at least a minimum level of agency and thought (Nussbaum, 2011, p. 25).

This chapter provides an example of a technology with consequences that we are unable to accurately predict. We cannot know what kind of GM will be developed in the future, and of those that are developed which may become necessary for individuals to achieve their basic entitlements, that is, the central capabilities necessary to be a fully functioning member of their society. This chapter demonstrates that this is not a problem for the capabilities approach or for my argument that

states must ensure some HETs to prevent inequality. If a HET is developed, such as GM, that is required for individuals to achieve their central capabilities, and live lives as humans with dignity equal to that of others, then for a state to be just it must ensure access to that technology for its citizens. It is not the specifics of the technologies in these examples that is important to consider, rather, it is important to consider the potential outcomes of these technologies, and their impacts on society in general. This is why I propose applying the capabilities approach in the first place, rather than judging each technology on a case-by-case basis. The capabilities approach provides us with guidelines for what kinds of technologies just states must ensure. It does not require states to ensure technologies X, Y, and Z, but, rather, it is a broad approach that covers all possible technologies. The capabilities approach argues that in order to be just states must ensure that their citizens are able to do certain things. This sometimes requires states to ensure certain technologies are available to their citizens, specifically those that are necessary for individuals to achieve their basic entitlements, that is, having the ability to achieve certain central capabilities.

Chapter 9: Potential Limitations

This chapter considers whether my argument that states should use the capabilities approach to guide their regulations aimed at preventing harm from HETs is likely to be successful. It is possible that my focus on capabilities to prevent harmful inequality will be ineffective at preventing harm as the harm associated with inequality is generally related to resource inequality, which capability equality is unlikely to ensure. However, I argue that the common focus on resources is what is truly misguided, and that capability equality is more likely to prevent harm than a focus on resources or utility. In this chapter I also consider the potential for the capabilities approach to regulate HETs that pose harm other than inequality. I argue that the capabilities approach is perfectly suited to cope with these kinds of HETs and will likely recommend a variety of regulatory options to prevent harm from any HETs, and at times this may include banning some harmful technologies. I also briefly consider another potential harm from HETs, that their very development would be harmful. I respond to this concern by arguing that the capabilities approach would also be able to regulate the development of HETs if applied to such a concern. I conclude that the capabilities approach can be expected to successfully and provide valuable regulatory advice to prevent a range of harms from HETs, including those posed by inequality as well as the threat of harm from these technologies themselves.

Someone could object to my proposal by arguing that ensuring capability equality would not prevent the harms associated with inequality as these harms are associated with resource inequality, and, thus, as ensuring equality of capabilities would be unlikely to ensure resource equality the harm I aimed to prevent would remain. However, although harm from inequality is generally cited as correlating with resource inequality, this focus is misguided. Resource equality is only instrumental to preventing significant harm as the true harm from inequality is due to inequality of

capabilities. Therefore, although resources are instrumental for the goal of preventing harm, ensuring equality of resources will not completely solve harmful inequality. To be successful at preventing harm, states must focus on ensuring capability equality rather than focusing on resources or utility.

Harm from inequality is often attributed to resource inequality, such as differences in individuals' income levels (Wilkinson and Pickett, 2007, p, 1976). However, the capabilities approach was developed due to problems with using resources as a measure of equality and well-being. Sen (1979, p. 218) argues that when we consider resources we are misguided; what we really want to know when we assess whether people have resources is whether they are able to achieve the valuable ends that resources are meant to allow them to. If Sen is correct, then when studies show that resource inequality is harmful the inequality that is actually harmful is capability inequality, which is correlated with resource inequality. There is a correlation between resource equality and lower levels of harm because resources are instrumental to individuals achieving central capabilities, and being able to achieve central capabilities means individuals can achieve well-being. This means that, although studies show that individuals in states with high levels of resource inequality are more likely to experience a range of negative outcomes, these harms are not due to the resource inequality, but, rather, the capability inequality that resource inequality can contribute to. If Sen is correct then reducing resource inequality may also reduce harm. However, this reduction in harm is due to resources being instrumental to achieving capabilities, rather than having resources truly being well-being. Thus, reducing resource inequality would have a positive impact on capability inequality. However, states can be expected to be much more successful at reducing harm if they directly focus on reducing capability inequality.

Although harmful inequality is often correlated with resources it also has a relationship to how individuals feel. At least a proportion of harm seems to come from individuals' perceptions of their

position in society. When a society is more unequal an individual's position in the hierarchy matters more and this leads to increased perceptions of inequality and competition between individuals, in turn this also leads to a range of associated negative outcomes, as discussed in chapter 1. It seems that the perceived importance of hierarchy would be present regardless of the kind of inequality that exists, as long as the inequality can be perceived by the citizens. Although resources may be an obvious way for individuals to judge their position we know from the discussion in chapter 2 that judging a society on its resource equality is unsuccessful as a measure of justice, and is unlikely to prevent harmful inequalities. There is no reason to believe that individuals with equal resources will consider themselves equal in the hierarchy of society. Individual differences mean that the same resources do not necessarily allow individuals to achieve the same ends, and, thus, having the same resources is unlikely to cause individuals to feel equal to others. Therefore, not only is resource equality a poor measure for states to use to evaluate potential actions, but ensuring this equality of resources is unlikely to cause individuals to feel, or be, equal to others in the social hierarchy.

This is where the capabilities approach provides real benefits in terms of states actual abilities to prevent harmful inequality. The capabilities approach recognises the importance of both resources and individuals perceptions, however it does not require states to focus on these measures directly. Rather, the capabilities approach argues that states will be most successful at preventing harm if they focus on capabilities directly. Even if this focus will not completely solve harmful inequality it is still the most likely method to prevent harm. Although Sen would argue that two individuals with the same capabilities, but differing resources, should consider themselves as equals it is unclear that they actually would. An individual's perception of their own position, and that of others, is not necessarily an accurate reflection of society. This problem is no different to that discussed in capabilities theorist's discussions of utility as a measure of equality. How people feel about what they have is not a good measure for states to use for determining their requirements; individuals'

perceptions of their requirements are not necessarily a good measure of their requirements, and, therefore, a perfectly acceptable state can be seen as negative by the citizens, or an unjust state judged as positive, if individuals' perceptions are the judge. Thus, using this as a measure is not practical, nor is it good at producing a just result.

Even if ensuring equality of capabilities will not remove all perceived inequalities this does not mean that it is not a valuable goal. For some injustices we must simply accept them as there is nothing we can do about them. The state cannot completely control how individuals perceive their position in society, if individuals have all the same central capabilities then the state has done as much as required to remove inequality. Although negative outcomes are associated with individuals' perceptions of a strong hierarchy within their society, this is not something that can be completely solved by a just state as it would require them to undertake unjust actions, such as by providing more to some simply because they feel that they have less, when this is not actually the case, while potentially also removing the little some have if they feel it puts them above others. These actions would clearly not be just, therefore, the state should focus its actions on ensuring its citizens' basic entitlements, central capabilities, not directly on altering its citizens' perceptions or utility. There is an independent measure of what it is for two individuals to be equal, as far as the state is concerned, that is that they can both achieve their central capabilities and lead the lives they have reason to value. Whether these individuals perceive these circumstances as equal or not is not the concern of the state as a focus on how individuals feel is unlikely to lead to a just result.

Ensuring equality of capabilities is unlikely to mean ensuring equality of resources or perceptions of social position. Differences between individuals mean that it is impossible for equality of resources to produce equality of outcomes and solve the harms of inequality. Even if resources are necessary they are only a means to the valuable end of actual equality that a focus on capabilities will more

successfully ensure. It is also unrealistic to judge a state on their ability to ensure all individuals are equally happy or have similar levels of utility, individual differences mean that two individuals equally able to achieve the life they have reason to value can feel significantly different about their positions. One individual who is seriously unable to achieve central functionings may be perfectly happy with his deprived life, while another individual who is able to achieve the life she has reason to value may still be unhappy with her arguably totally acceptable life. Neither resources nor utility are acceptable measures of state action in terms of preventing harmful inequality. This is precisely the reason the capabilities approach was developed, as a practical replacement for other measures of justice. The evidence that inequality is harmful may focus on resources or utility but this focus is misguided, the actual harm from inequality comes from individuals having differing capabilities and solving this inequality can be expected to solve harm from inequality to the greatest degree a state can be reasonably expected to.

An additional issue for the potential of the capabilities approach to prevent harmful inequality can be seen with the difficulties posed by the importance of personal responsibility. For example, the states responsibility to individuals who choose to not accept a technology, even if it is offered free of charge by the state. In theory, if a HET was necessary for an individual to fully function as a citizen and the state made it available to all of its citizens, so that they all had the ability to function fully as citizens, and pursue the life they had reason to value, then the state would have succeeded in fulfilling its responsibilities, even if some individuals chose to not utilize the technology and achieve the functioning. If using this technology made individuals able to achieve the central capabilities, the individuals who choose to not accept the technology would not be able to fully function as citizens and achieve well-being. However, like the fasting man this may not be a problem for the state as they should not force individuals into achieving functionings but rather should ensure that all of their citizens have the ability to choose to achieve the central capabilities.

By ensuring the technology is available it may initially seem that the state has done everything required to allow its citizens to have this choice.

For example, if a LET was developed that allowed almost anyone to live significantly over 200 years, with minimal risks and maintaining youthful stamina and health for the majority of this time, as discussed earlier in the thesis, the state would be required to ensure this technology was available to all of their citizens, so that they could all achieve the central capability of life. However, a portion of the population may find themselves opposed to this technology, for religious, moral, or personal reasons. Individuals would be unable to fully achieve the capability of life without accepting the LET, however, the state, by ensuring the technology is available to everyone, has made this capability open to all of its citizens. Thus, as in the case of the fasting man (who chose not to eat even though nourishing food was provided for him), it would seem that this was not a concern for the state as the individuals who reject the technology are making this choice freely, based on their conception of the good life, and the state's only responsibility is to allow its citizens to make this choice, not to force them to choose one way or another.

However, simply ensuring the technology is available may not be sufficient for the state to fulfil its responsibilities. The abilities made possible by this LET would also be necessary for other central capabilities, and, thus, the person rejecting the LET would not only be rejecting the capability for life but also the capability of control over one's environment, as they would be unable to attain desirable employment or have similar control over the political environment as others due to their significantly shorter life span. Now the question becomes slightly more complex, should an individual's choice to not achieve one capability remove his choice to achieve other capabilities? If this were the case could the state still be considered equal and just?

Consider again the individual choosing to fast, if she starves until she is so malnourished that she is unable to achieve any other capabilities, is this still a just situation where the state has no further responsibility to her than ensuring food is available? If this choice is freely made it does not seem to be a problem for the state as she is freely choosing to fast. An individual could freely choose to reject all of the central capabilities, and the state would still be considered just, if the individual had the ability to achieve them and the choice was freely made. However, the state must investigate the barriers that are preventing someone from achieving the central capabilities they are entitled to. Although it may initially seem that the choice to not achieve these capabilities was freely made this may not be the case, and the state must investigate this and actively work to remove the barriers that were preventing the individual from achieving the capability. In the example of the fasting person, it may be that the reason she chooses to fast is that the only means of nourishment offered to her is animal meat and she is morally opposed to the consumption of animal products, and, thus, the state would not be doing everything reasonably possible to ensure she has the capability to be fully nourished if it did not ensure she has access to other forms of sustenance. Therefore, if it is able the state must do more to ensure that the individual can freely choose to achieve the capability.

In the case of the individuals rejecting LET, their moral (or similar) opposition to the technology may mean that, similar to the vegetarian fasting person, their choice to reject this technology and the capabilities it offers is not truly freely made. In order to protect these individuals' capabilities to the best of its ability it seems the state would be required to do more than simply offer a technology that the individuals are morally opposed to, as then these individuals would not be able to maintain a life of dignity and respect no matter their choice to accept or reject the technology. If they reject the technology they are likely to be bound to a life of poverty, without the ability to attain employment that would give them the opportunity to control their material environment, they may be reduced to begging for food and shelter if no other support is offered. This is clearly unjust. However the alternative, that they accept the technology and can gain employment would also be

unjust as the individual would lack self-respect by taking an action that they consider to be morally objectionable. These individuals cannot make a free or dignified decision to either accept or reject the technology, and, thus, it seems clear that the state must have some further responsibility to them. It may be impossible for the state to allow them to live as long as others who accept the technology, however, this does not mean that it can neglect their other capabilities. The state must consider the barriers that are preventing its citizens from fully functioning as citizens, living the life they have reason to value with dignity and respect equal to that of others, and take active steps to deconstruct these barriers.

In the case of LET, simply ensuring the technology does not seem to be sufficient to account for the individual differences and values that are so essential to the capabilities approach. The capabilities approach aims to ensure anyone with all kinds of values and beliefs can achieve the capabilities necessary for a life of human dignity and respect, and, clearly, simply making technology available is not sufficient to mitigate the potential harms of enhancement inequality. If an individual is forced to choose between two equally undesirable options they can hardly be seen as making a free choice, and the state must ensure they have alternative options that are acceptable. This will require more than simply making technology available to all. Exactly what this extra help would look like is an important consideration for future research. The literature would benefit from examination of what else a state must do, other than simply ensuring necessary HET are available, to be just and secure the central capabilities to its citizens while preventing harmful inequality.

Another consideration for state regulation is the serious potential for HET to have harmful consequences. While throughout this thesis I have promoted the potential benefits of these technologies, they also have the potential to cause harm. For example, George Annas (2010, p. 309) is concerned that if a new or 'better' group of humans was created through genetic modification that this could lead to genocide. He is concerned that if substantial changes were made to some people

then they would be seen as separate, other, and that the unenhanced would be viewed as 'lesser' humans. His concern is that that it may be seen as acceptable to slaughter or subjugate these 'lesser' humans (Annas, 2010, p. 320). Annas (2010, p. 323) even goes so far as to consider genetic engineering, cloning, human-machine cyborgs, xenografts, and brain alternations as 'crimes against humanity', potentially even an act of terrorism, as he argues that they threaten the integrity of the human species itself.

However, attempting to prevent these possible harms by banning HETs is unlikely to be a productive solution. As I argued in Swindells (2014), an outright ban on HET is unlikely to prevent their development and will only serve to further restrict access from the poor, increasing inequality and the development of two classes of humans. Whereas, if access to HET is supported by the state and all individuals have the opportunity to become enhanced and join this group of 'better' humans the differences between these groups are likely to become significantly less important. However, as discussed earlier, some individuals can be expected to reject these enhancements and remain unenhanced, and, therefore, simply ensuring the technology is available may not be enough to save the moral equality that will protect us from the genocide Annas fears. It is up to the state to ensure all, including those who reject HET, retain their central capabilities, including being protected from harm and persecution by others. The state must not forget the horrors of the past and must protect all groups from persecution by another. This will require the state to act to mitigate the differences between these groups and to protect any group from attack by another, no matter how separate or 'non-human' they perceive that group to be.

Further, if the essential equality of humans cannot be ensured, or other serious harms be prevented, in a society that allows these technologies then under the capabilities approach they would not be acceptable. The central goal of the capabilities approach is to ensure that all individuals can achieve their basic entitlements. Although I have generally spoken about this in terms of the state providing

something to make this possible, it is also possible that to ensure these capabilities the state must restrict the liberties of some, such as by banning access to certain technologies. The capabilities approach allows states to develop a variety of conclusions and policies to best prevent harm and ensure the equality and entitlements of their citizens. I maintain that an outright ban would be ineffective, however, I do acknowledge that in some circumstances it may be the state's best option to prevent harmful inequality, or even genocide.

Some HETs (e.g. gun implants) would obviously be banned under the capabilities approach, as ensuring they were available to all might prevent inequality but would not prevent their other harmful consequences. Enhancements that increase individuals' abilities to harm others, by allowing those using these enhancements to threaten the capabilities of others, would not be acceptable under the capabilities approach. If a weapon implant were developed that increased an individual's ability to control others with force this would pose unacceptable risks to individuals' capabilities, such as the capability of bodily integrity which includes the ability to be free from violent assault. Although states providing this technology to all of their citizens would reduce inequality, as then not only the rich would be weaponized, this would clearly not be the best way to prevent the harm posed by this technology. Rather, gun implants, or other similar enhancements, would require an alternative regulatory action under the capabilities approach. It seems likely that the best way for states to prevent the harm associated with such a technology is through banning it to prevent all of their citizens from accessing it. Even if such a ban were not totally successful this would not make aiming to enforce it an undesirable goal.

In these cases, that require other regulatory action, it is not that the capabilities approach has failed to ensure a just result, rather, the capabilities approach has shown its true strength. That is, that the capabilities approach can allow states to know the best action to take to ensure the well-being of their citizens, to fulfil their basic requirements. This means that although I argue that ensuring

technology is likely to be the best method to regulate and prevent harm from most HET, the capabilities approach would not require a state to ensure, or even allow, a harmful technology. Thus, at times the capabilities approach would recommend an alternative regulatory action. The capabilities approach can be used to assess the likely outcomes of any technology that is developed and provide policy advice to best ensure individuals' entitlements and well-being are protected. Policies to achieve this goal are likely to come in a range of forms from banning some technologies, while others require no regulatory action at all. However, I argue that, in most cases, because HET are developed for the benefit of humans and will cause significant changes in what an individual needs to be able to do to be an equal citizen, the state will be required to ensure these technologies are available to all, to ensure their benefits are equally dispersed and prevent harmful inequality.

Finally, this thesis focuses on the issue of access to developed, and presumably safe, HETs. However, the capabilities approach is also likely to be a useful tool for determining potential harms associated with the development and testing of HET. For example, an experiment or human trial that would unjustly reduce an individual's central capabilities would not be acceptable under the approach, and, thus, under the capabilities approach governing bodies would be required to prevent such an experiment. Future research would benefit from consideration of the applicability of the capabilities approach to further regulatory issues surrounding HET.

Although these concerns are important to consider, they pose no threat to my claim that states should use the capabilities approach to guide regulation of HETs to prevent harm. Ensuring capability equality may not ensure resource equality or make individuals feel equal in the social hierarchy. However, the capabilities approach can be expected to be a more successful guide for state policy to prevent harm than these alternatives. The capabilities approach is also well suited to prevent harm from HETs themselves, such as that posed by enhancements that threaten individuals' central capabilities. In these cases the capabilities approach clearly shows that some enhancements

are truly harmful and may need to be banned in order to prevent harm, specifically when the harm does not primarily come from inequality and would not be solved by ensuring these technologies are available to all. It seems that the capabilities approach can also successfully be used to regulate other areas of enhancement technologies, such as their development. Overall, the capabilities approach is able to be applied to the regulation of HET and provide realistic policy advice that can be expected to ensure the state prevents harm and fulfils its requirements to the highest possible level. The capabilities approach has proven to be a valuable regulatory tool to prevent harm and ensure justice due to its ability to apply to any possible technologies and recommend a range of appropriate regulations to best ensure just results.

Chapter 10: Conclusion

This thesis rose from a problem identified in Swindells (2014); human enhancement technologies (HET) are being developed that will greatly change what people are able to do, and this can be expected to cause great inescapable inequality if access is left unregulated. Further, this inequality can be expected to cause significant harm to everyone, not just the poor who immediately seem worst off. Therefore, it is in everyone's best interests for states to act to mitigate this inequality. I concluded in Swindells (2014) that states acting to ensure HET to their citizens would have the best chance of retaining the benefits while preventing harmful inequality. However, it would be unrealistic to expect all states to ensure all HET to all of their citizens in order to prevent harmful enhancement inequality. Clearly some of these technologies will be unnecessary, or unrealistic for states to ensure. Therefore, it must be determined which HETs a just state must ensure to prevent inequality. In order to effectively do this the state must have a framework or guideline for evaluating HETs that allows them to easily determine what regulatory action to take to best ensure justice and prevent harm.

In this thesis I proposed that the capabilities approach could be applied in order to determine which HETs a state must ensure in order to be just. The capabilities approach was developed as a means to assess the justness of a state by determining whether it ensures its citizens have equality of what it calls 'central capabilities'. Under the capabilities approach a state is just if it ensures its citizens have access to the HETs necessary for the central capabilities. That is, the HETs necessary for an individual to fully function as a citizen, with dignity equal to that of all other humans. For my proposal to be acceptable, first some HETs must be necessary for the central capabilities, and, secondly, a state ensuring these capabilities must be able to prevent harmful enhancement inequality. I argued that clearly some HETs can alter capabilities, this is essentially their only

purpose, and, further, this change in capabilities is such that it requires states to ensure these technologies to their citizens. Clearly some HETs are able to alter what an individual must be able to do in order to fully function as a citizen, and, thus, the state must ensure these technologies are available to their citizens to achieve their basic entitlements. My examples showed how, not only does the capabilities approach require states to ensure some already existing technologies, but, it will also easily determine which future HETs must be ensured by a just state.

My proposal of the use of the capabilities approach to guide state action can be defended against a range of potential criticisms. Someone may argue that my focus on capabilities would not solve harmful inequality as the harm is due to resource inequality. However, inequality of resources is harmful because it contributes to capability inequality. Thus, the capabilities approach can be expected to be more successful at preventing harm than a focus on resources or utility. The capabilities approach can also deal with situations where individuals' capabilities are reduced by their choice to reject HET. These cases demonstrate that states must, at times, do more than simply providing the technology to their citizens if they are to ensure their capabilities are protected. The capabilities approach is also useful as more than a tool to determine which HETs states ought to ensure to their citizens. We can see that some HETs are harmful, and to protect its citizens from these technologies the state must act to restrict access to these harmful HETs. This may include banning some technologies where the main harm is not caused by the inequality they may create but from their direct impact on individuals, society, and capabilities. This conclusion further strengthens support for the capabilities approach as it demonstrates its ability to provide valuable advice regarding HET, including recommendations of bans for certain technologies that, if accepted, would only cause harm.

Applying the capabilities approach to determine how states should regulate HETs in order to be just can be expected to be a successful method for combating harmful enhancement inequality. The

capabilities approach not only supports states ensuring the availability of HETs to prevent inequality, as I concluded in Swindells (2014), but the approach also requires states to take a variety of other regulatory actions to prevent harm from HET. The capabilities approach will allow states to not only determine which HET to ensure, but also to understand what it means to have ensured these technologies, such as determining to what level they must be ensured, and when the state may need to ban a technology that threatens harm other than those posed by inequality. Applying the capabilities approach to the problem of enhancement inequality can be expected to provide real policy advice to assist states when they are considering how to best mitigate harmful inequality. It tells states what they must ensure to their citizens and also to what level they can be expected to ensure it to. In terms of regulating HET, the capabilities approach provides states with regulatory advice regarding all possible technological developments in a general way by providing a framework to determine what regulatory actions best ensure justice and prevent harm. Not only can the capabilities approach provide guidance around technologies that already exist but it can also be expected to appropriately deal with unpredictable future technologies and their unpredictable impact on society. Therefore, the capabilities approach can be applied to developing HETs to determine how a just state must act to protect their citizens from harm and ensure their basic entitlements are met.

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