The Case for Hope: Good Storytelling in Foresight and Public Policy

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This paper is interested in the practice of foresight and its influence on governments and decision-making at the dawn of the fourth industrial revolution. Governments from around the world have used foresight to various degrees to develop, think about and plan for a better future. Foresight refers to the use of scientific methods that are geared to the construction of futures based on the analysis of trends and possibilities. Foresight's objective is to facilitate anticipatory governance (Ramos 2014). Despite its potential for transforming the way governments work (Roberge 2014), foresight is applied unevenly across states and jurisdictions. There are many reasons explaining why governments are reluctant to use foresight (Roberge 2013) including preoccupations with immediate political priorities and a lack of policy capacity. With the imminence of the fourth industrial revolution, however, governments are confronted by many political and policy choices each with long-term and serious consequences. Foresight is needed to generate the intelligence required to develop and implement required public policies and to assist in mitigating challenges, emergencies or even forthcoming crises. Governments already have to manage policy issues that relate to the fourth industrial revolution for which foresight knowledge – by identifying and extrapolating from intersecting developments and prospects – could and should be utilized to inform decision-making.

To study foresight, this paper considers emerging narratives and stories about the fourth industrial revolution. At the 2016 World Economic Forum, Karl Schwab Founder and Executive Chairman stated, 'this fourth industrial revolution is … fundamentally different. It is characterized by a range of new technologies that are fusing the physical, digital and biological worlds, impacting all disciplines, economies and industries, and even challenging ideas about what it means to be human' (Schwab 2016). The fourth industrial revolution refers to the developments of artificial intelligence, robotics, and the web of things, big data and 3D printing, and major advances in the fields of nanotechnology and biogenetics. The fourth industrial revolution will revolutionize everyday life – and, may generate all types of new wealth – but, it also generates fears about a future substantially different than the world we know today. For governments, the fourth industrial revolution presents policy challenges on a scale and at a pace not previously experienced, and their preparedness and response is still ill-defined.

How is foresight to be better integrated into the political and policy process to aid in navigating the fourth industrial revolution? In this paper, I make two interrelated arguments. First, I argue that foresight is as important as ever to provide important and necessary knowledge about the fourth industrial revolution. At the onset, governments have the opportunity to help determine the direction and possible progress of the fourth industrial revolution; foresight can assist in the decision-making progress, especially by focusing on possible consequences and impacts of policy decisions or non-decisions. Foresight is not to predict or invent this future. Rather, foresight facilitates futures' construction in support of policymaking. Second, foresight needs to make better use of narratives and storytelling to influence policies about the fourth industrial revolution. There are two broad narratives about the fourth industrial revolution taking shape, decline and collapse and transformative change. The fourth industrial revolution is described via three main stories, interpreted differently across each narrative: an economic revolution; the linearity of technological developments; and, accidental trajectories (all addressed below). The narratives and stories of the fourth industrial revolution, however, do not provide a clear path forward to more agreeable futures. Foresight will be most impactful if it tells better stories that identify required policies and action as well as outlining possible consequences. Will governments be more attentive if better stories are told? Compelling narratives, as related via stories, have the power to define policy options, ideas and interest, in turn, facilitating decision-making. Policymakers, and the public, will find it easier to engage with foresight if the product is more engaging. Government's uneven use of foresight, therefore, is an opportunity lost whereby knowledge is under-utilized at a time when it is much needed in planning and delivering on the potential of the fourth industrial revolution.

This paper is divided into three sections. First, foresight as a concept is reviewed and its strengths and limitations are noted. Second, the centrality of narratives in politics and policy is discussed with a view to foresight. The third section of the paper considers the key narratives of the fourth industrial revolution and their main stories. The conclusion reiterates key findings. The research for this paper was conducted by means of a literature review including primary and secondary sources.

Foresight

This section considers foresight, its added-value, limitations and contradictions to identify its role in public policy at the onset of the fourth industrial revolution. Governments' interest in foresight is not new and can be traced back to ancient history (Colonomos 2014). The construction of a scientific field of studies – future studies – using foresight, however, is much more recent and dates back to the years that followed the end of the Second World War (Seefried 2013). During this period, Western governments believed in central planning and their ability through public policy to effect social change. Foresight's rise was also accompanied by the development of new and rational social science research methods. Since these early days, foresight application has varied greatly across country and time periods. Foresight has often been used to study geo-politics, military affairs and technological innovation. It has expanded its reach to many other areas of research including environmental studies, economic forecasting,

health, demographics and social policy, among others. There are a number of leading states in the use of foresight including, the United Kingdom, the Netherlands and Singapore (Habegger 2010). There are countries, in turn, where foresight is present, but in a much less integrated way. Canada, for instance, has a dedicated office to assist in foresight research – Policy Horizons Canada – though its influence is limited (Roberge and Dinning 2013). Some countries like the United States do not have a centralized foresight strategy. Much foresight work is conducted, as well, by subnational governments (ex. Lombardy – Vecchiato and Roveda 2014; Lyon – Molin 2012). The EU, the OECD (Stevens 2011) and other international organizations also conduct foresight-based research. Many in the private sector are at the leading edge of the field; foresight can have a direct impact since research and innovation are essential to developing new products and failure to adapt can ultimately lead to bankruptcy. Foresight is not ubiquitous, but its potential and added-value to policymaking is clearly recognized.

Foresight is a scientific process geared to analyzing possible futures. It is an integral part of – individual, governmental and institutional – decision-making, whether acknowledged or not. Decisions are made based on assumptions about the future. The assumptions are often intuitive, though they can result from a more thorough analysis. Decisions reflect the actor's perception of likely futures – outcomes and impacts – when comparing across options. Rational decision-making, as such, is anchored in knowledge, assumptions and beliefs about plausible futures. Foresight builds on rational decision-making by using the scientific method to consider conceivable futures. Foresight has a variety of methodologies at its disposal, many of which are common across the social sciences: literature reviews, expert panels, questionnaires and surveys, interviews, brainstorming and workshops, forecasting, scenario building, trend extrapolation, Delphi technique, environmental scanning, system mapping, emerging issues analysis, and SWOT analysis (Popper 2008). Foresight's strength, therefore, is anchored in its capacity to generate knowledge, quite often, through dialogue (Amanatidou 2014). Foresight research aims to be systematic, focused on the long-term horizon, and is to consider in an objective way the gamut of all possible futures. Foresight is supposed to lead to action in order to achieve desirable futures or, at the very least, to avoid worst case scenarios.

There are many reasons why foresight in government is desirable. The most important reason is that futures' analysis is to lead to better public policy, or to what some have called anticipatory governance (Ramos 2014). Foresight's promise is to be of use in solving so-called 'wicked problems'. Foresight is supposed to facilitate a democratic dialogue on 'desired' futures. From a practical perspective, foresight may be most useful in specific policy fields such as health, the environment, or urban planning and in the analysis of interdependent trends. There are many other advantages to using foresight. Among them, foresight can assist with the management of risk, including planning for emergencies and crises. As for the fourth industrial revolution, foresight can facilitate recognition of interconnected trends in various fields such as artificial intelligence, robotics and big data, possible developments, unintended consequences and impacts. Decision-makers can use this knowledge to determine more appropriate policy options and to make informed decisions. Foresight matters if it is acted upon, and incorporated into

policymaking. Foresight projects abound, but governments' use of this research is more circumscribed. Foresight's own limitations as a field of study and practice partially explain its more limited influence.

There are important limitations to foresight, some that go beyond those that are normally acknowledged as they pertain to research in the social sciences. There is a large literature in the field of futures studies that attempts to remedy limitations by focusing on methods and ways by which to make foresight more amenable to governmental practices (among many, Kuosa 2012). This literature often deplores governments' attitude towards foresight, and it seeks to refine foresight techniques in order to increase its appeal. Foresight practitioners seek to align their practice with the needs of governments (ex. Calof and Smith 2012). Experts' underlying assumption seems to be that the more scientific the practice of foresight, the more its results will be taken seriously by governments and decision-makers. At the same time, the development of foresight as a science alone seems unlikely to lead to greater applicability. Limitations, in fact, strike at the heart of the foresight concept. Governments may recognize intuitively these limitations, partly explaining the reluctance of decision-makers to use the results of foresight research. Narratives and storytelling can assist in overcoming some of foresight's shortfalls.

Three weaknesses must be considered. First and foremost, foresight is quite often wrong (Colonomos 2014). Foresight's inability to imagine systemic transformations such as the fall of the Soviet Union or major crises reinforces the notion that the future is open-ended despite the work of the best available minds. Futures remain unexpected and it may not be worth the effort to decipher them. Nordmann adds, 'One can be prepared for the future without seeking to know what the future will be like. In fact, trying too hard to imagine possible or plausible futures may diminish our ability to see what is happening' (2014: 88). Governmental intervention today can lead to undesirable unintended consequences that could have been avoided if patience had prevailed and no action been taken.

Second, 'imagined' futures may serve political ends (Stockdale 2013). Policymakers can use foresight to facilitate adoption of measures that otherwise would have been deemed unacceptable. As an example, foresight can serve to justify policies based on a potential yet to be fully determined threat. Since the threat is in the future and ill-defined, it may be hard to disprove. The opponents of a measure will have difficulty opposing it since the future threat limits the range of acceptable options. The threat of a future large scale terrorist attack will serve to justify security measures despite potential negative consequences to personal privacy. The counterfactual is hard to demonstrate; does increase security work in preventing a terrorist attack or would attacks have been avoided irrespective of adopted measures? The harm to personal privacy, however, is real and immediate. As well, it is possible to imagine foresight becoming a self-fulfilling prophecy.

The third weakness of foresight refers to how it is practised. Foresight for it to be most effective should be open and projects should facilitate and encourage democratic debate. Research results, however, tend to reflect the overall consensus of experts (Colonomos 2014). Some methodologies like the Delphi technique are built to generate agreement. The problem, as previously observed, is that this consensus may be wrong. This is not to say that foresight cannot accommodate discordant views, but clearly it is not possible to act upon or even to consider as equal all purported views. Foresight should consider, in theory, the gamut of all possible futures including those that appear to be less realistic. Foresight's prescription is logical in that decision-makers ought to be, at the very least, aware of grave, even if unlikely, scenarios. This prescription, however, is not practical and leads to research results that focus on the consensual and the most likely or anticipated scenarios.

There is a corollary to the argument above. Good foresight projects are difficult to conduct. Foresight requires creativity and imagination; these are desirable traits, but they are hard to generate. In foresight projects, people have a hard time imagining the possible, or rather the impossible. They often focus on today's problems and how best to solve them without full consideration of possible evolutions. Technological advances are hard to foresee. Broad trends may be discernable, but the interplay of diverse variables as they interact over time is more difficult to ascertain. As such, foresight may actually not be telling us much about the future.

Foresight is the systematic process by which possible futures are constructed. It can make the future more approachable, encouraging good decision-making. Foresight's own weaknesses, however, limit its applicability. Assuming that foresight is still desirable, how are limitations to be overcome? And, what does foresight tell us about the fourth industrial revolution?

Narratives and Storytelling

The importance and role of narratives and storytelling in political science and public policy is well-established. Focused on electoral politics, Sheafer et. al. note, 'Political life is fundamentally about building the future through visions of present and past, and combining visions of history with current politics has always been a basic part of political discourse' (2011: 315). Foresight must make better use of the rhetorical culture, 'the shared, changing, sometimes varied and often contested expectations of how claims about the political world may be appropriately and legitimately formulated and justified' (Atkins and Finlayson 2000: 163). The challenge for foresight is to incorporate research results into the broad political and policy narrative through compelling stories to inform and to influence behavior. The added-value of narratives and storytelling to foresight is that it makes futures more approachable, and less disconcerting, because once presented they have been imagined. For the purpose of this paper, foresight has to assist in building the stories that inform on futures about the fourth industrial revolution.

Narratives reflect social constructs that include stories with protagonists and storyline and often have a moral or an ethical component. There are two types of narratives, descriptive and prescriptive. Descriptive narratives provide metaphor or analogy-based stories. The objective of

these stories is often to foster a greater understanding of a particular event or series of events. Prescriptive narratives induce action (Austin 1962). The public accepts that action is necessary to take advantage of an opportunity or to resolve a challenge. Whether descriptive or prescriptive, narratives serve political ends. As Shenhav states, 'studying political narratives and the processes that shape them can shed light on the ways in which information, values, ideologies and beliefs are transferred in the course of making politics' (2005: 315). Narratives include many stories each with its protagonists that tend to build on one another. The stories feed into a narrative enhancing its credibility and its perceived truthiness. Borins (2011), for instance, uses narratives to study public management and presents fables both of organizational and personal growth and decline. What makes for a good story? To determine the details of what makes a good story is beyond the scope of this paper, nonetheless, it is possible to suggest that, at a minimum, good stories in politics provide a discernible way forward. Narratives are dominant and socially accepted. They define political and policy options as well as desirable objectives.

Foresight is most compelling when it provides 'hope' for a better tomorrow (Ogilvy 2011), but this is a promise on which it has difficulty delivering. Dator (1998) has identified four possible futures, each a narrative with its own set of scenarios or stories: continuation, limits and discipline, decline and collapse and transformative. The first future refers to the perpetuation of the current political and economic model. The limits and discipline future recognizes the need to adjust due to constraints such as environmental degradation, but it does not fundamentally challenge the extension of current trends. The decline and collapse future suggests that the world has reached its environmental and economic limits, and that we are on the verge of a breakdown. As an example, in a controversial study in *Ecological Economics,* Motesharrei et. al. (2014) built a model that emphasizes the possibility of civilizational collapse. The fourth future presupposes major changes, though they are less defined. They may, in fact, represent some form of 'back to the future' scenario. Dave Hutchinson's fictional series of novels beginning with *Europe in Autumn* (2014) which sees a redrawn map of Europe around micro-states may be a good example of a transformative future.

There are across the four futures very few optimistic scenarios. Dator himself states, 'We believe it is no longer possible to argue about the existence of global climate change and sea-level rise; the end of cheap and abundant oil before equally cheap and abundant energy sources come online … the non-viability of the global neoliberal economic system with no alternative and equitable economy system anywhere in sight; and the inability of any current systems of governance … to address any of these issues effectively' (2004). Halal and Marien speak of a mega-crisis, ' … a global environmental and economic collapse, or near collapse, along with attendant problems of rising prices, mass protests, wide-spread psychic stress, and lawlessness' (2011). Foresight scholars will argue, in fact, that such a critical outlook is essential as a foundation for building better futures. Slaughter states, 'Post-conventional futures work is not for the faint-hearted but it does suggest a range of constructive responses to a world currently set on the path to oblivion' (Slaughter 2006: 24). What is foresight's role in fostering and

developing positives futures? Constructed narratives and derived stories must ultimately demonstrate that good outcomes are possible.

There is another consideration in the construction of foresight narratives. Good foresight stories are both useful *and* creative. Imagination is necessary to overcome foresight's prejudice in practice vis-à-vis consensus and to allow for a diversity of perspectives. Schwarz (2015) inquires how foresight can help break down cognitive barriers to help people think beyond the present time. He argues that literature, in particular, can help surmount this challenge. He states, 'The 'Narrative Turn' in developing foresight argues that organisations should not so much focus on storytelling but rather on story listening, listening to stories in the organisational environment' (Schwarz 2015: 512). Foresight need not only be in the hands of foresight practitioners, scientists, economists, etc. Foresight also draws from the arts, works of fiction in literature and movies. Storytelling and story listening represent powerful foresight instruments to assimilate and make sense of uncertain futures.

For foresight to matter, it must instill action. Foresight has limitations of its own that it must overcome. The use of narratives and good storytelling can support foresight in imagining futures. Foresight will get it wrong, but an important part of its added-value is its capacity to get people to think about and ask some of the right questions about the future. This reflection is expected to facilitate conscious decision-making. Can foresight overcome its own contradiction to present futures that go beyond the consensus? Storytelling emphasizes originality, creativity and hope. Foresight, as such, is not about the single likeliest scenario; rather, it re-embraces the need for diversity through the construction of different worlds. Foresight can strengthen futures' narratives through better stories, prescribing, at times, much needed political action.

The Fourth Industrial Revolution

The importance and severity of the fourth industrial revolution has risen in people's consciousness in recent years. As a concept, the fourth industrial revolution implies that society is on the cusp of major changes because of continuing developments in artificial intelligence, robotics and the web of things, big data and 3D printing, as well as nanotechnology and biogenetics. Foresight has the potential to be a useful instrument to consider possible futures in light of these developments. Foresight's limited reach, however, impedes its ability to shape debate. What narratives are emerging about the fourth industrial revolution? What are the stories that are being told? What role is foresight to play in defining futures that are to emanate from the fourth industrial revolution?

As its core, the fourth industrial revolution is said to represent something that is fundamentally new, unlike anything that humanity has seen before. While lessons can be drawn from history and previous industrial revolutions, the scope and pace of change expected are said to make current developments distinctive. The fourth industrial revolution may, indeed, be different because it raises questions about what it means to be human. The launch of *Neuralink* by Elon

Musk, the founder of Tesla, to merge the human brain with artificial intelligence raises exactly this type of challenge (Clark 2017). As the argument goes, the development of artificial intelligence and of robotics are to render humans obsolete (Kaplan 2015). Colvin (2015) in *Humans are Underrated* argues the opposite and suggests that the people who will succeed in the new economy will be those with a high capacity for empathy and that robots will have a hard time replacing human to human interaction. Whatever the case may be, it is assumed in this paper that the fourth industrial revolution represents something substantially different than that which humanity has experienced before and that, in all likelihood, it will raise deep questions about the very nature of our humanness and the purpose for our existence.

If the fourth industrial revolution is so engrossing, what are the emerging narratives to describe and explain the multiplicity of changes that are now starting to take shape? What are the stories that are being told about the world of tomorrow, especially since the fourth industrial revolution seems to be bringing science fiction to life? There are two broad narratives that are starting to surface about the fourth industrial revolution. Debates about the fourth industrial revolution assume that the continuation and limits and discipline futures are unlikely. The substance and pace of change are perceived as sufficiently momentous that they cannot be described as strictly evolutionary. The narratives, therefore, centre on the decline and collapse future and transformative change. The narratives, in turn, are underpinned by three major stories (based on current trends): a revolution in the economy and in the way people work; linear technological developments; and, accidental trajectories. The difference between both narratives is, in part, that the decline and collapse future is presented as quasi-predetermined, and the transformative change future appears more open-ended. Because the transformative change narrative represents drastic change, it remains disconcerting. The objective is not to present one narrative simply as gloom and doom and the other as representative of a 'better future'; rather, the narratives help show the multiplicity of issues and how they intersect. Neither narrative is all encompassing. Via these narratives, the challenge for foresight is to help construct paths to better futures, while still accounting for the various facets that are fostering the fourth industrial revolution. Below, we address the two narratives by quickly focusing on each of the stories identified.

The first story is about the revolution in the economy due to radical technological change. The story usually addresses the end of work whereby humans are replaced by machines, increasing wealth disparity and idleness. Changes in the economy are already apparent. Rapid technological developments in artificial intelligence, big data, robotics and 3D printing, among others, are significantly affecting the labor force, and the way people work. The story that is most often told is about the worker that is to become obsolete. The fear that robots will replace humans in the workplace is not new, but it may now be coming, partially, to fruition. Davidow (2014) notes, 'Machine intelligence is already having a major effect on the value of work – and for major segments of the population, human value is now being set by the cost of equivalent machine intelligence'. In the future, there may well be more workers than available and necessary work for humans to perform and the result could be higher levels of unemployment

and a large pool of unused or underutilized labour. At its 2016 meeting, the World Economic Forum estimated that five million jobs across fifteen major economies would be lost before 2020 because of the fourth industrial revolution (WEF, 2016). While it is assumed that manual labor is affected first, there are solid indications that professionals will also be impacted. Richard and Daniel Susskind (2015) provide an extreme view on the future of the professions in which they argue that machines will soon be able to do much of what professionals do today. When it comes to the practice of law, medicine or even teaching, they argue that machines will have an increasing role in the delivery of services to clients. The story has major political, social and cultural components that are rarely if ever fleshed out. Governments, it is often said, will need to manage the inherent wealth disparity between the few that work, and the idle majority and references are made to a guaranteed minimum income. The full impact of idleness, though, remains hard to discern. There are good reasons to doubt the rise of the 'leisure society', but as robots replace human in the workplace, the question of what workers will now do is likely as pertinent as ever. As 'old' jobs disappear, it may be that new 'jobs' still un-dreamt of are to be created and that expressed concerns about work are overblown. Irrespective, the speed of change is disturbing and creates uncertainty fuelling the story of a future without work.

The decline and collapse future narrative about the economy has been challenged. For instance, the argument that robots will replace humans is contested by those that see a future where the most likely outcome will be for machines and humans to work side by side (Jordan 2016). Ross and Jamilly state, 'The long age of using our inventions as tools is about to be superseded, as we increasingly design our inventions as partners, working in harmony together to multiply each other's potential' (2016: 47). At its most optimistic, changes are said to present tremendous opportunities, 'For the most talented, imaginative and technically qualified people, the new industrial revolution will create huge opportunities that will turn out no less exciting than those that changed the world during the original industrial revolution of the late eighteenth century' (Marsh 2012: 247). Technological developments may very well lead to jobs that are still, for now, unforeseen and create new opportunities for wealth creation. At a minimum, the field of economics is not settled and models still show that the people most affected in the near future are those currently working in low-skilled employment, 'Our model predicts a truncation in the current trend towards labour market polarisation, with computerisation being principally confined to low-skill and low-wage occupations. Our findings thus imply that as technology races ahead, low-skill workers will reallocate to tasks that are non-susceptible to computerisation – i.e., tasks requiring creative and social intelligence. For workers to win the race, however, they will have to acquire creative and social skills' (Frey and Osborne 2017: 269). How will humans and robots interact? What will the equilibrium be in that relationship? At the very least, the decline and collapse future is nuanced by this second story of a fully transformed economy.

There are two other stories to consider about the fourth industrial revolution. The decline and collapse narrative, especially, is often built according to expected linear developments. Moore's law for computing in which processing power doubles every two years repeatedly serves as the rationale. From this perspective, the evolution of AI must lead to some form of predetermined

superhuman. The debate around the technological singularity represents the extension of this conversation (among many, Ford 2015).

The transformative change narrative presents an alternative to the story on the all-encompassing AI. The transformative change story argues that AI developments are misunderstood. Kelly (2017) explores the 'myth of the superhuman AI' and argues that technology is field specific. From this perspective, AI will provide invaluable knowledge in support of human activity. There is another alternative, less popular, but that describes possibilities for a brand new 'humanity': whole brain emulation. Robin Hanson (2016) describes the operations of a society composed of fully emulated brains. He presents this development as more likely than the more traditional AI-based future. Undoubtedly, AI or whole brain emulation raise profound moral and ethical dilemmas about what it means to be human.

The third preponderant story of accidental trajectories suggests that even if the fourth industrial revolution may eventually lead to a better future, the road to getting there will be bumpy and difficult. The use of new technologies by criminals, terrorists or rogue states poses a major threat to society. Marc Goodman in *Future Crimes* (2015) highlights this development spectacularly. When putting the misuse of technology story together, the end result becomes particularly gloomy. Kile goes as far as to suggest, 'This unfortunate confluence of events flowing from technological society has given rise to an ironic pairing of possible societal futures: 1. An explosion of mass idleness flowing from the encroachment of technology on society; 2. Use by large groups of idle and dissatisfied people of weapons provided by technology. If this occurs, human society will be on its way to fulfilling Einstein's macabre warning, 'Word War 4 will be fought with sticks and stones'' (2013: 114). The alternative version of this story, of course, emphasizes the possible positive externalities from technological developments, especially in specific policy fields like healthcare or the environment. Whichever narrative is selected – the decline and collapse scenario, or the transformative change future – it is important to remember that there is no 'predicted' future. What is missing from each narrative, therefore, is how to proceed to more desirable futures.

Foresight, as stated above, is about influencing decision-makers to take action, but the narratives and their stories focus first and foremost on the potential of technology. Stories fail to address issues of governance, and the important decisions that need to be taken soon. There are, in fact, many calls for greater governance to help shape desired futures. Maynard, for instance, states:

> The convergence between robotics, nanotechnology and cognitive augmentation, for instance, and that between artificial intelligence, gene editing and maker communities both push us into uncertain territory. Yet despite the vulnerabilities inherent with fast-evolving technological capabilities that are tightly coupled, complex and poorly regulated, we lack even the beginnings of national or international conceptual

> frameworks to think about responsible decision-making and responsive governance (2015: 1005).

Marchant and Wallach (2015) go further arguing that the very structure of government is inadequate to deal with the many challenges brought about by the fourth industrial revolution, 'The concerns raised by many emerging technologies go well beyond the health and environmental risks traditionally covered by regulatory statutes, to also include broader ethical, social, and economic concerns, including privacy, fairness, ownership, and human enhancement issues' (2015: 45). They note that our societies do not have a lot of experience responding to rapid transformation in complex technologies because they never have had to do so before. To put it bluntly, governments have a central role to play in managing conversations about the fourth industrial revolution, yet they may be unable or unwilling to do so. Foresight by appropriating and further developing the narratives and their stories can provide governments with the knowledge necessary to help manage forthcoming transformations.

There is a last element for which foresight by telling better stories can play an essential role in advising about the fourth industrial revolution: ethics. The stories above clearly demonstrate the various moral and ethical challenges associated with rapid technological innovation. Kernaghan (2014) summarily presents many of these already occurring trials for public organizations including, for instance, basic questions of privacy protection. The list of ethical questions raised by the fourth industrial revolution is too long to list and goes beyond the objective of this paper. Stories, though, can underline ethical dilemmas. Among stories often repeated, who is legally responsible when a driverless car has an accident? What if the car has to decide between saving the lives of its passengers and saving the lives of bystanders? What considerations will be taken into account? How will the car be programmed to make such a decision? Programmers need to decide on what the car should do, for which a priori debate is important. As Durbin argues,

> It is ultimately the invention of technical languages – nowadays almost always embedded in machines or robots or technical information systems – that is truly revolutionary. In this sense, the technical language-based gadgets and systems are not the revolutionary agents of our times. Particular technological communities – all the way to the business or governmental leaders that employ the people who invent and use the new technological modes of information sharing – are the true revolutionary agents. Technological languages, and technological gadgets (of whatever kind), do not drive postmodern society. Particular people do. And their goals are not always democratic (2013: 53).

As the fourth industrial revolution unfolds, response to ethical dilemmas will become ever more important in determining ways by which to ensure the preservation of humanness.

The narratives, and their derived stories, about the fourth industrial revolution need to be strengthened to assist decision-makers, to facilitate public debate and to encourage action. Many of the stories have been around for a long time (ex. human labor and automation) that

some skepticism is normal. There are also stories about the fourth industrial revolution that appear far-fetched (ex. a society of whole emulated brains) making it is hard to take them seriously. Most notably, though, the two main narratives do not provide stories with clear pathways to better futures. There is still the opportunity, thus, for foresight to detail stories that provide hope and a sense of purpose and direction.

Conclusion

Foresight has the potential to be a potent tool for the development of good public policies. Governments, generally speaking, tend to underuse foresight. In this article, we have been concerned with making foresight more policy friendly through better storytelling concentrating on the challenges posed by the fourth industrial revolution. Foresight as a scientific approach has weaknesses that it needs to acknowledge and to overcome. The construction of narratives and greater emphasis on storytelling can make foresight stronger making it a more compelling instrument for policy and decision-making by making futures approachable. Foresight can assist government in forging a path forward in light of forthcoming drastic political, economic, social and cultural transformations. Current narratives about the fourth industrial revolution – the decline and collapse future and the transformative future – are composed of unfinished stories. Foresight is at its best when its stories are about hope and when they provide pathways to more desirable futures. Narratives about the fourth industrial revolution, as such, are perplexing. The future is always uncertain and a source of anxiety. The seemingly passive attitude of many governments in regards to the fourth industrial revolution only serves to heighten concerns. If the fourth industrial revolution is as dramatic as is envisaged foresight can mitigate concerns by encouraging important public debates and inciting immediate action. Foresight does not need to be nor should it be prescriptive. Through good storytelling, however, foresight can create vivid images to inspire better policymaking and help create better futures.

There are many areas of possible future research. The use of narratives and storytelling in foresight could still be further refined. Also, the narratives and their embedded stories about the fourth industrial revolution, as presented in this paper, are under-developed and need to be further expounded upon. Most notably, it would be interesting to compare the stories about the fourth industrial revolution across societies and cultures. For instance, stories that figure robots prominently must account for the fact that cultural readiness vis-à-vis robotics varies across regions. This paper has also not considered at all what the narratives and stories about the fourth industrial revolution in developing countries might resemble. The fourth industrial revolution is in its early phases so that its development will most certainly provide the opportunity for much reflection.

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