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Artificial Intelligence and Urbanization: The Rise of the Elysium City

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Abstract. From ancient times, Greek religion introduced Elysium as a heavenly place to which admission was exclusively reserved for mortals related to gods, heroes, and those blessed by gods. We argue that the rise of artificial intelligence technology will lead to the creation of Elysium cities. Elysium cities agents will be technologists, technocrats, intelligent machines, and wealthy capitalists. These cities will be the first embracers of the artificial intelligence technology and will do so by incorporating five capabilities: physical, intellectual, information, governance, and socio-economic. As early adopters, these cities will acquire tremendous political and economic power and will turn into self-governing city-states. During the early stages of the AI revolution, these Elysium cities will shed millions of unemployed via a process we call De-tech Migration. De-tech cities will be the recipients of the labor migration from the Elysium cities and will rapidly become and remain impoverished. This article presents key policy suggestions that can be adopted by companies and governments to avoid potential decline and find new pathways towards growth and prosperity in an artificial intelligence economy.
Keywords. Artificial intelligence, Urbanization, Smart Cities.
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1. Introduction

Greek mythology and religion contain the idea of Elysium - a place exclusively designed for the mortals related to gods, for heroes, and for those authorized by gods. A 2013 Matt Damon movie Elysium painted a scenario where the rich and the powerful lived on a satellite habitat located in Earth's orbit while the impoverished dwelled on an overpopulated Earth. Disease and starvation afflicted the land dwellers, as Elysium inhabitants lived in profound luxury and with access to excellent healthcare. We anticipate that the rise of artificial intelligence will lead to a similar scenario where few cities will acquire that elite status and that this scenario would happen within the next two to three decades. This paper shows how and why. We also argue that the change will be permanent and that there will be very few options left to counter that.

Urbanization is one of the most powerful feature of the industrial revolution. As the industrial revolution progressed, so did the urbanization - and when the industrial revolution transformed into information revolution, urbanization intensified even more. Today more than 50% people live in cities (Wimberley & Fulkerson, 2007).

It is no secret that at the heart of both information and industrial revolutions was "machine" (Aspromourgos, 2012; Mokyr *et al.,* 2015; Wilson, 2014). It is machine

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that spun, rolled, steamed, moved, cut, calculated, and stored data. It is machine that shifted workers from farms to factories and migrated people from rural areas to cities. Machines are dependable and predictable, and we quickly learnt to build our complexes of progress around machines. Assuming no malfunction, a given input to machines always resulted in predictable, predetermined, and expected output. As machine dutifully accomplished the tasks assigned to it, whether virtual (digital) or mechanical, it did that being subservient to human will and command. Wheels spun when accelerator was pushed and computers calculated when buttons were pressed. But there was a limitation. Even though machines could perform specified tasks, they could not reason, think, feel, or learn. Faculties such as intelligence, sense, feeling, and consciousness were not attributed to machines in the manner they were to humans.

While the advent and development of machine has led to successive waves of migration to cities throughout the human history, the underlying nature of machine has remained the same. Whether it was automating physical tasks such as grinding, cutting, wrapping, and farming or outputting digital data and performing computations, machines operated under the strict and specific directive given to them. Computer applications did not think, reason, learn, adapt, or experience just as lawnmower or snow blower did not do any of that. In that regard, computers were no different than cars. They did exactly what their operators wanted them to do and their failure to do so is considered malfunction. When machines did not perform in accordance with the wishes of the operators, operators did not conclude that their computers or cars are learning or adapting or evolving, they attributed that to improper handling, operator knowledge and experience, and machine break-down (Bourgain *et al.,* 2014). Thus, in all such cases the operator expectation was that for a given input machines will always give a certain discrete set of predetermined output.

As digital machines (aka computers) launched the information revolution, modern cities jumped to embrace the technology. To signify the advanced adoption of information technology unleashed in the twenty-first century, cities were dubbed as "smart cities" and significant literature developed to highlight the features and attributes of such cities. For example, smart cities tend to take on a holistic and long-term approach; they address both the hardware and software of cities (Caragliu *et al.,* 2009); sustainability and environment have been included as important attributes of smart cities (Giffinger *et al.,* 2007); smart cities also consider the economic viability of their courses of action; they nurture learning and innovation and allow avenues for creativity, knowledge creation, digital frameworks and management knowledge to flourish (Komninos, 2006); their policies aim to stimulate business activities (Hollands, 2008); inclusiveness and societal betterment tend to be emphasized by smart cities; they link universities, industries and government (Lombardi *et al.,* 2012); their building blocks include industry, learning, engagement and technological infrastructure (Giffinger *et al.,* 2007); and the operating model of smart cities, digital network enhances economic, political and social development (Hollands, 2008).

Besides being smart, cities are also viewed as complex systems: Humans and other organic components, as well as material components, make up a city. But material components without humans is just a simple system. It is the urban agents that make a city more complex – and a complex system. (Portugali & Stolk, 2016).

Thus, the presence and interaction of humans is what makes cities complex. Obviously if somehow humans disappeared and the only things that remained were artifacts and non-human animals, we would probably not classify cities as complex systems. Thus, qualities unique to humans - such as consciousness, intelligence, creativity, peculiar response to the demands of survival, evolutionary conditioning, and human behaviors - are what give rise to complexity.

Going back few decades, when we added information technology to our city artifacts (e.g. bridges, roads, telecommunications etc.), and we began calling our cities "smart", we were not elevating them to the status of intelligent beings or conscious artifacts. We simply implied that we were adding information technology components to these artifacts so that we can receive more information about them, cause kinetic mechanisms, or provide a mechanism for people to interact with each other better. Similarly, when we use the term "smart" for cities, we generally do not imply that the city has developed consciousness or intelligence as a human or biological system - we use the term figuratively and as a "marketing" allegory.

Machine, is also one of the artifacts created by humans and since the complexity of cities emanates from humans, it is humans and not machines that contribute to the complexity of cities. Tononi, who presented a powerful theory to measure consciousness, gives the example of a photodiode that is placed in a room and is tasked to determine when there is darkness or light in the room (Tononi, 2008). As light switches between on and off, the photodiode outputs a binary value indicating light or darkness. However, if a human was sitting in the room, she will be able to do the same but her information processing will be extremely different than the photodiode. She will be able to tell the colors, the shapes, and other features in the room etc. In fact, she would be able to eliminate all the possible shapes when she would study a shape, all the possible colors when she sees a color. She is processing information much differently and is processing much more information than the photodiode. This should shed light on the difference between a machine and a human. Simply because machine can perform a certain task does not imply that it has consciousness - just as, only because a city has technological infrastructure, doesn't make it "smart".

In general, we can conclude that what was not implied in the term "smart" was that the city artifacts will acquire intelligence, city agents will develop a collective consciousness, machines will become city agents, or that machines will develop a mind of their own.

Recently, the field of artificial intelligence has emerged on the technological horizon. This field is attracting powerful investment and generating great results. To differentiate between functionally intelligent vs. self-aware machines, two broad types of AI are emerging: Narrow AI and Artificial General Intelligence (AGI) (sometimes also referred as Strong or Human-Level). Narrow AI is functional and problem solution focused – for example self-driving cars, healthcare application, trading algorithms. While Narrow AI does learn, adapt, and adjust to optimize the solution, it lacks self-awareness. Artificial General Intelligence is when machine becomes self-aware and develop human like intelligence (Goertzel, 2014). To our knowledge, this has not happened yet. Known as Singularity, the point when artificial intelligence will develop human like intelligence is expected to happen in the next two decades (Kurzweil, 2005). Some scientists disagree with that timeline or even the possibility (Goertzel, 2007). However, the authors of this article believe that it will happen. One of the authors of this article has written a chapter in a book in which he discusses the invention of artificial consciousness. Thus, we make a clear distinction between heteronomous machines (machines incapable of learning or adapting) and autonomous machines.

We term machines (virtual or physical) that are incapable of learning or adapting as heteronomous machines. In these machines, a given input will always produce a precise, preordained, fully expected output resulting from known processing that takes place within the boundaries of a machines. Subservient to human will, these machines will always perform in accordance with the extremely limited tasks assigned to them. In contrast, in autonomous machines, the output generated can be variable, emanate from a very large set of possible outputs, and whose production process within the machine may never be known to an outside observer. The autonomous machines display that behavior because they are capable of learning, developing, and even reasoning. They understand their environment and act in accordance with their agendas and include future considerations in their decisions and actions. See (Franklin & Graesser, 1997) for discussion on the definition of autonomous agents.

Thus, it was heteronomous machines and not intelligent (cognitive or conscious) machines on whose shoulders we formulated the theoretical foundations of our social sciences. Whether industrial psychology or economics, organizational theory or urbanization, the industrial and information era models were built upon heteronomous machines and not autonomous machines. The underlying theories view machines as neutral artifacts around which humans gather to improve productivity, manufacture objects, create data, etc. Needless to say, if the underlying assumption about the nature of machine changes, our approach to analyze social sciences theories may stand in need of revision.

Accordingly, when it comes to urbanization, embracing autonomous technology will require some explicit changes in how we approach planning. For instance, the dynamics of a complex system will become even more complex with the introduction of autonomous systems. Now, besides humans, another intelligent stakeholder will be introduced into the mix. The exclusive role of humans in increasing the complexity of cities will no longer be exclusive. Machine and human interactions will drive the decision-making and behavior. This is analogous to, only on a broader scale, the modern and upcoming human-robot social interactions in the organizational context (Moniz & Krings, 2016). Thus, it should come as no surprise that becoming a smart city by incorporating heteronomous technology is very different than doing so with autonomous technology. The added complexity of incorporating the needs and requirements of autonomous agents will require a new level of planning and thinking. To signify that difference, we will term the artificial intelligence city as "AI Smart city."

2. Building the Artificial Intelligence (AI) Smart City

The White House has issued two reports on artificial intelligence. Both reports contained promises and perils of artificial intelligence. Despite the perils, in our opinion, the reports exhibit a sense of optimism and showcase government's commitment to continue to support innovation and research in artificial intelligence (White House, 2016a, 2016b)

With the promise of powerful growth, it is not a major leap to assume that smart cities will be interested in embracing the artificial intelligence technology. Some of the factors that will stimulate cities to embrace the AI technologies are:

Productivity- Research shows that AI related growth can increase productivity by 40%. Increase of productivity by 40% is monumental and game changing. Thus, to stay competitive and to increase productivity a city would have to embrace the technological advancement produced by artificial intelligence (Purdy & Daugherty, 2016).

Production of goods and services- Business concentration lead to benefits within and across industries (Sohn, 2004). Cities provide temporary material and immaterial structural flows (Amin, 2004). Urbanization in cities has an impact on the modalities of production (Kim & Margo, 2004). Specifically, artificial intelligence impacts many areas of science and technology and hence the potential to launch new products and services will be huge (Dirican, 2015).

Economic magnets- Some cities have become job creators. Many migrants are drawn to cities due to hopes of finding industrial jobs, and taking part in economic development and growth (Phillips, 2014). Cities can merge into "super cities" and become economic powerhouses (Lang & Dhavale, 2005). The revolutionary transformation of artificial intelligence will create powerful new technology jobs. Cities would want to stay on top of job creation.

Social hubs- Cities are major venues for socialization. With increases in social networks, there is an enhanced ability to gather more information of jobs (Granovetter, 1995). Urbanization offers benefits associated with scale and diversity (Henderson *et al.,* 1995). With increased population, there is heightened socialization and advances in learning (Storper & Venables, 2004). Artificial Intelligence will introduce new forms of social interactions. In some cases, the interaction will be between machine and humans (Moniz & Krings, 2016).

Knowledge centers- Cities are centers for idea production and knowledge acquisition which expands commercialization (Feldman & Audretsch, 1999). Urban growth positively impacts firms and employees in knowledge intensive sectors (Wood, 2006). Aggregated human capital will produce knowledge spillovers which benefits the entire location (Simon & Nardinelli, 2002). Since artificial intelligence impacts so many fields and disciplines, powerful knowledge centers will emerge in cities. These knowledge centers will be consolidated and comprehensive with multidisciplinary representation.

Strategic production- Through the formation of technological parks, export processing zones, and free trade zones many cities have attracted manufacturing firms. There are three benefits associated with manufacturers being clustered in one location: 1) specialized supply points, 2) labor pooling, and 3) knowledge dissemination (Marshall, 1997; Fujita *et al.,* 1999). With artificial intelligence, cities will have even more integrated and consolidated manufacturing, distribution, and retail system.

Technology and innovation drivers- Cities have become locations where the latest technological breakthroughs are discovered and disseminated. Population density impacts the ability to generate innovation (Sedgley & Elmslie, 2004). There is a perceived link between urbanization and economic growth due to labor efficiencies, lower cost of production, increased spillovers in technology and management (Gabe, 2004; Sedgley & Elmslie, 2004). In growing cities, there is also an emergence of an integrated system of production and service related to technology (Hutton, 2000). Agglomeration contributes to technological change (Sedgley & Elmslie, 2004). Thus, welcoming technology development is not something progressive cities would decline.

Effective service support- Accessibility of top rate service support heightens the attractiveness of cities. Service structures abbreviated as CARE -Culture, Amusement, Recreation, and Entertainment- would likely increase in numbers (Knox, 1991) and attract workers and investors in cities.

Based upon the above, we make an educated assumption that cities will indeed be interested to bring in artificial intelligence and to benefit from the potential and growth. The sheer power of the technological change will compel and convince ambitious cities to realize the benefits of the new technology. After all, technology sets the stage for innovation. Technology communities set the stage for the development of new innovations (Jauhari & Benard, 2010). Information technology contributes to innovation through: knowledge, efficient production and inter-organizational coordination (Kleis *et al.,* 2012). Infusion of technology improves organizational and operational efficiencies. Information technology enhances productivity and improves procedural performance (Menon *et al.,* 2000; Tallon & Kraemer, 2006). The successful development of technology in a city setting requires buy-in from the community. Technology adoption entails technological acceptance by individuals and its applicability to society (Baron *et al.,* 2006). Successful technology absorption also requires that new products or services created offer real value – which is the case in artificial intelligence (White House, 2016a). It should be created and utilized by the community and for the community. For instance, information usage should include not only data collection, but also data processing and analysis to help drive decisions for the government, private sector and citizens (Banavar, 2012).

However, as we discussed previously, transforming into a smart city based upon heteronomous technology is very different than becoming a smart city based of autonomous technology. A city that will aspire to become the early adopter of artificial intelligence revolution, the AI Smart City, will need to respond to the unique requirements of artificial intelligence artifacts and agents. Specifically, we argue that five capabilities will need to be incorporated to become an AI Smart City:

1) Physical Infrastructure Modifications: Autonomous cars on the road, social robots on the street, drones in the air, robotic surgeons and physicians, work robots,

intelligent agents in cyberspace - will all become part of the artifacts as well as in some ways city agents. Even without self-awareness, the complexity of their tasks will require a certain level of spatial freedoms of movements. This implies that cities would have to incorporate changes that facilitate the infusion of autonomous technologies in the mix. For instance, the advent of autonomous cars may require how city plans for parking. Cab service with autonomous cars will have some meaningful differences than the one offered with non-autonomous or heteronomous cars. Autonomous cars will need no break except to charge batteries and hence can be out on the road 24/7. The convenience and safety of using the cab service will reduce the need to own cars. The value of "driving pleasure" may get replaced by valuing time and productivity enhancement that comes from not having to drive. This implies that the available capacity of a "parked asset" (cars) will be fully optimized and hence the number of cars on the street may decline significantly. This also means parking needs may get altered. Building constructions, access, roads, street systems, work areas, and other such considerations must be taken into consideration to accommodate mobile robots, drones, and autonomous cars.

2) Intellectual Infrastructure: Artificial Intelligence research is coming from different areas and it will impact almost all other fields. The field gets contribution from fields such as psychology, neuroscience, different fields of engineering, cognitive science, computer science, mathematics, philosophy and others. Artificial applications are emerging in almost all other fields including healthcare, finance, accounting, music, arts, nanotechnology, neuroscience, genetics, 3-D printing, and molecular imaging. The AI revolution requires, and results in, creating symbiotic relationship between various fields and hence the knowledge centers would be linked with all other fields. The isolation of departments will no longer be the norm. The rise of autonomous technology and its impact on all sciences, arts, and social sciences will drive knowledge consolidation. While it can be argued that virtualization of research can link up distant instant institutions but the proximity of resources will likely drive knowledge centers to collaborate to gain operational efficiencies. Thus, a true network of capabilities will drive and intensify the revolution. Technology converge industries and cultivates synergy. There are opportunities for open innovation or collaboration with external firms to expand knowledge (Chesbrough, 2003). Collaboration with partners with resources leads to acquisition of knowledge (Dyer & Singh, 1998). Information technology brings firms together and facilitates agglomeration (Sohn *et al.,* 2003). In turn, agglomeration spurs technological change (Sedgley & Elmslie, 2004). Knowledge is created faster through the presence of technology. Firms can transfer knowledge to other companies (Lichtenthaler & Lichtenthaler, 2009). Firms in diverse industries have collaborated with external sources to expand internal knowledge (Beamish & Lupton, 2009).

3) Information Infrastructure: A robust and powerful information technology infrastructure will be necessary. Many transformational cities already have this and are actively building innovative architecture to unleash the power of existing talent and skills sets in their locale. This includes the creation of data centers, telecommunication hubs and many more. In cities around the world, Technology Parks have been created by governments to optimize talent and to provide added advantages to companies.

4) Governance and regulatory: A comprehensive governance program and regulatory support structure will be needed to drive responsible growth in artificial intelligence. Governance mechanisms will be critical not only to protect privacy but also the rights of city agents. Artificial Intelligence technology is not like other technologies and will require a dedicated ecosystem of governance and regulations. This includes strategies to build trust (Hengstler *et al.,* 2016), understanding the strategic impact of the technology (Lauterbach & Bonim, 2016), incorporating morality in agents (Wiltshire, 2015), exploring role in civil defense (Carlsen *et al.,* 2014), developing property rights frameworks (Davies, 2011), developing legal

liability frameworks (Čerka *et al.,* 2015), and a comprehensive regulatory framework (Scherer, 2016).

5) Socio-Economic: Technology defines the community and society that it is a part of. Technological activities are embedded in society (Baron *et al.,* 2006). New technologies require overcoming technology, business, organizational and societal issues (Freeman & Soete, 1997). A corresponding complementary socio-economic policy will be needed to ensure that the introduction of artificial intelligence technology fallout is managed and that the society prepares for the massive transition to the rise of autonomous agents (Hengstler *et al.,* 2016).

Cities that will implement the above will make the fastest transition to become AI Smart City.

3. Turning into an Elysium City – The Initial Phase

A sustainable utilization of technology in cities means that the economics must make sense. A smart city should have the right people, in the right numbers, working technology in the right way (Banavar, 2012). But the economics of the artificial intelligence economy are different (Hanson, 2008 ; DeCanio, 2016).

Building an AI Smart City will require significant multi-disciplinary talent however as technology will grow the talent will concentrate on relatively fewer scientific and high complexity disciplines. As capital becomes the dominant factor of production, the tax basis of the AI City would likely shift from income to capital. The AI Smart City will become a magnet for the super-talented, for the scientifically advanced, technologically trained, and those with the resources to invest and profit from the AI advances. With the up to 40% productivity improvement potential (Purdy & Daugherty, 2016), the investment returns will be tremendously high and continue to be sustained with ongoing innovation.

Autonomous agents and artificial intelligence automation come with two important features:

Exhaustive Ubiquity- one powerful feature of artificial intelligence artifacts is that the creation of one instance of a functional model will be sufficient to solve a global or widespread problem. For example, a fully functional automated English speaking therapist (psychologist or counsellor) will be able to replace all English-speaking therapists in the world. One instance of a tax accountant specialist for a given country can serve the needs of an entire population. One software perfected for an autonomous car can run all similar cars.

Accumulated Experience- the other key feature of artificial intelligence artifacts is accumulation of experience. This feature of the technology is constantly being improved. Since artificial intelligence is a learning system, it accumulates experience and hence the relative age of the technology matters. Although, the underlying design - driven by the algorithms or implementation of the neural network - can also have an impact, within the similar implementation the technology with longer experience may have an edge over the one with less experience.

When combined, these two features manifest in generating atypical dynamics. Many current professions will become obsolete and the related job losses will not just be in what was traditionally considered as low-skill jobs but will include many professional jobs. Studies have shown that the job loss will be deep and widely prevalent and the replacement jobs will not be sufficient to fill the void (Frey & Osborne, 2013). Even simple assumptions such as with autonomous cars cab drivers will be out of job is not a hard to imagine scenario, however many jobs that are today considered high-skill jobs could be downgraded to low-skill (Autor, 2015; Autor & Dorn, 2013; Goos & Manning, 2007). Job polarization is already happening (Goos *et al.,* 2009; McAfee & Brynjolfsson, 2016) and does not appear to be dependent upon singularity. Artificial intelligence is learning to be an accountant, an architect, a designer, a singer, a composer, a teacher, a scientist, an artist, a retailer, a trader, a doctor and the list goes on and on.

Since the growth prospects, quality of life, and financial returns will be significant for the technically trained and capital investors, they will accumulate in the AI Smart Cities (Amior, 2014). Others however, the ones facing permanent unemployment, will have no choice but to move out of the city and move to a less advanced city where non-technical, less-technical, and human-art skills will still be available and valued. While behavioral studies have shown that workers are more likely to leave a deprived city vs. a prosperous city and many factors impact such choices (Kley, 2013), the prosperity of the AI Smart City will be highly selective. We have observed the relationship between poverty and social exclusion (Samers, 1998). When cities change and influx of new upper-income enter the mix, the underprivileged suffer from political and cultural displacement (Hyra, 2014) - and while the underprivileged don't quickly leave the city, perhaps due to low-income housing programs and social safety nets, in the long run economic concerns can lead to reverse migration and shrinking cities (Sturtevant, 2014; Rieniets, 2009); for example such reverse migration was analyzed in Africa (Potts, 1995). For our specific context of such an out-flux from AI Smart Cities, we use the term De-tech Migration to signify process of reverse migration and De-tech city to describe the city that will become the recipient of the migrant workers and their families.

Thus, on one hand we will observe an influx of the super-talented and the capitalists to AI City and on the other hand we will see an out-flux of migrant workers to low-tech cities.

This non-AI labor forces will migrate to the cities that will be lower on the ladder of artificial intelligence automation. We call this De-tech city - a city that will absorb workforce from a more advanced artificial intelligence city.

4. The Elysium City - The Final Act

To make our point, we will use the example of a system composed of five cities- A, B, C, D, and E cities. Let us assume that as an early adopter of artificial intelligence, city A will become the first AI Smart City. It is important to recognize that as a leader of innovation in a technology class that features Exhaustive Ubiquity and Accumulated Experience, city A's technology will be most developed and will eliminate the need to develop similar technology elsewhere. For example, if City A developed a competent tax accountant agent, that agent will be able to serve the needs of cities B, C, D, and E. This implies that with each successive wave of innovation emanating from city A, the opportunity to emulate the success of city A will become less and less likely for other cities.

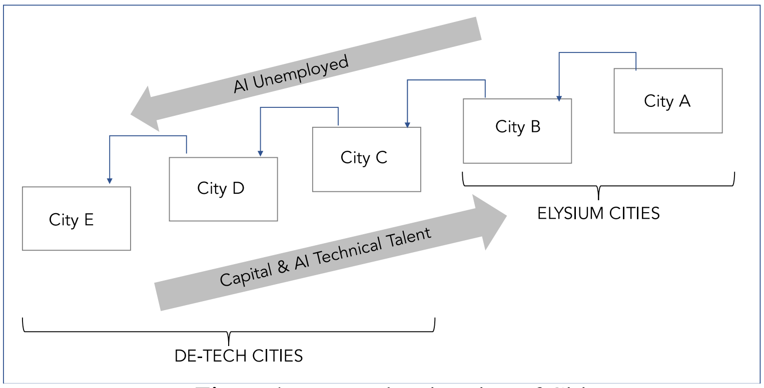

Figure 1. *De-Tech Migration of Cities*

This obviously does not mean that city B, C, D, and E will not try to emulate the success of A. In fact, one of them (let us assume B) may succeed in building some capability, even though it will always have a disadvantage when compared to A since A began sooner than all others and hence has an accumulated experience advantage with respect to its technology.

Thus, a race will begin on who can solve more problems, who can improve more productivity, who can eliminate more jobs. The problem is that each successive wave of innovation in artificial intelligence will increase the influx of capital and technology talent from the remaining cities and will increase the outflow of unproductive workers to less advanced or de-tech cities. The comparative advantage of City A, and potentially City B, will turn these cities into fortresses of power and wealth for the city agents.

As the two advanced cities (in our example A & B) will trade technology and capital for non-technology jobs, the differential of progress between (A, B) and (C, D, E) will become enormous. C, D, and E will struggle to cope with massive inflow of the unemployed workers, as well as to deal with the loss of capital and technical talent. Their problems will mount and their ability to deal with the problems will diminish. Hopelessness will give rise to political turmoil, anger, disappointment, poverty, and major unrest. The law and order situation will deteriorate (Figure 1).

Life in the Elysium cities will be very different. When the fundamental relationship between the survival centric fear of a conscious biological entity, work that it performs to overcome such fears, and the incentives it receives get altered, many things change (Nilsson, 1984). Elimination of a lot of work will lead to improvement in quality of life for many. It has been argued that the development of Information and Communications Technologies (ICT) are giving rise to new collective consciousness (Heylighen & Lenartowicz, 2016; Heylighen, 2007) and while the arguments are focused on such consciousness to be global, for our purposes we can assert that it can also be city-based consciousness. After all, only because such collective consciousness exists doesn't make them immune to politics and power (Rosenblum, 2016). One manifestation of such a city-level consciousness could be the realization that the city must protect the interests of its agents. The two advanced cities, for example A and B, will have the incentive to preserve their wealth, quality of life, and safety. Such considerations often give birth to economic nationalism (Pryke, 2012) and the collective consciousness can contribute to solidifying such ideological basis. Economic nationalism can give rise to protectionism and enfranchising the AI Smart Cities to city-states.

These Elysium cities will have the resources to develop their own security (which will be largely related to artificial intelligence technology (Hellström, 2013)) as well as the means to implement such protectionist policies. The bitcoin (blockchain) currency is developing fast (Underwood, 2016), and such innovations can reduce the need for alignment into a federalist model. In other words, with an independent security and financial structure, the Elysium city-state can operate independently and without sharing its wealth with a federal unit.

5. Discussion

We are fully cognizant of the fact that we are drawing the picture of the future and the future can turn out to be quite different than what are presenting. However, based upon the arguments presented, we believe that the scenario presented is plausible enough that it demands more research and study. We want to set the stage for further research to take shape and for the dialogue to develop.

We are also aware that any critique of technological development runs the risk of being labeled as Luddites. This sometimes means being crucified without proven guilty, or even prosecution. However, we respectfully declare that such labeling is biased since it implies that the underlying conditions of Luddite concerns were same, or similar, as our concerns. In other words, simple explanations such as *history repeats itself* should not be used to reject legitimate concerns about the future. As we clarified, the nature of machine used in all previous analysis (industrial and information era) is not applicable to the artificial intelligence. AI has altered the nature of the machines and hence our social sciences need to be reevaluated considering this change.

The world we presented will be composed of few "haves" and most "have-nots". This was the world depicted in the movie Elysium. We believe that to avoid such scenarios, two policy initiatives can help. We also realize that our second suggested policy recommendations will create tremendous controversy.

Our first recommendation is that artificial intelligence development should be done in a planned way such that all regions of a country get to participate and that the prosperity is even and uniformly distributed across the country.

Our second recommendation is that governments worldwide should intervene and regulate the tech-giants in a manner that no single company should have all three components to develop artificial intelligence: data, machine learning application, and robotics. This means that in same manner as post-WW2 Japanese firms (zaibatsu) were segmented into tiers, the tech-giants should be split into manageable non-monopoly entities. For example, Google is building three capabilities. The firm has most advanced artificial intelligence applications, it has data on billions of people and organizations, and it is also venturing into robotics. The concentration of the three capabilities in the same entity can lead to immense power with such firms. This aspect of our recommendation will be discussed in a future article.

Rapid developments in AI are already transforming people, businesses and governments. This evolution will expand and accelerate in profound ways in the coming years. Organizations and cities that plan ahead and act early are well-poised to gain a unique edge. The potential of Elysium cities sets the foundation for capturing the new wealth of nations and gaining a contemporary competitive advantage but if such developments are not undertaken evenly and uniformly, it can mean disintegration of nations and countries.

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