THE PARADOXICAL AND THE REVERSIBLE: TOWARDS A CRITIQUE OF PERVASIVE COMPUTING AND THE INTELLIGENT NATION 2015 (IN2015) MASTERPLAN IN SINGAPORE

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Summary

This dissertation critically analyses the iN2015 Masterplan and pervasive computing by unpacking their discourses. I highlight how both are shaped by and shape their contexts, specifically, globalisation and its technologies, underpinned by neo-liberal values, post-Cold War techniques and technicity, coding needs and desires. I argue that the iN2015 Masterplan and pervasive computing produce active technological subjects needed to perpetuate the technological economy and the military, which, in turn, sustain their projects in a generalised cycle. In this cycle, humans are inducted into their codes that, paradoxically, subordinate them further under the logic of the technology.

Chapter One connects the iN2015 Masterplan and pervasive computing, situates them as products of neo-liberal values and Cold War technologies and technicity that function on the production of "blindness" and the consumption of their codes. I emphasise the mutually constitutive relationship between space, technology, discourse and embodiment. I also map out my methodologies and journey towards a critique of the iN2015 Masterplan and pervasive computing. Chapter Two situates myself and the development of my thoughts through a critique of my wearable artwork called the *Smart Apron*. Using the *Smart Apron* as a node, I complicate my belief in technological empowerment, vis-à-vis the wearable computing discourse of Steve Mann and the feminist cyborg discourse of Donna Haraway. I argue that despite differences in politics and ethics, the cybernetic subjects they valorise run the risk of feeding back into the technological economy and the military. Chapter Three analyses the iN2015 Masterplan through its video and rhetoric of technological empowerment, control and inclusion. I demonstrate how through the political economy of the sign and subject, patriarchal, neo-liberal technological subjects are produced to provide the conditions of possibility for Singapore's technological political economy and military. I highlight how the construction of technological spaces, use of education and policies, coincide with the transparency of discourse and the ability of new media technologies to make things visible and invisible in the process. Chapter Four looks at Mark Weiser's vision of ubiquitous computing and highlights how he creates transparent relationships with "invisible" technology through the "seamless" politics of everyday (future) life that erases the specific history underpinning ubiquitous computing. I bring in Genevieve Bell and Paul Dourish's critique of Weiser and argue that their discourse, a reflection of its context, mirrors Weiser's narrative and are equally productive of future technological development based on "alternative," "messy" views/use of ubiquitous computing in the present everyday life. Chapter Five looks at the mutually constitutive relationship between the iN2015 Masterplan and the Third Generation Singapore Armed Forces (3G SAF). In the synchronicity of their needs for and production of pervasive infrastructure and entrepreneurial technological subjectivities, I situate the iN2015 Masterplan as part of the larger militarisation of Singapore society, where through the circulation of elites and the "Total Defence" policy, no civilian space is spared, putting radical singular thought at risk. Finally, Chapter Six rounds up my arguments and considers the stakes of the iN2015 Masterplan and pervasive computing for our ways of being and becoming.

Chapter One:

Introduction

> "Architecture does not simply *enclose* but rather it *produces* space" (Ryan Bishop, John Phillips and Wei-Wei Yeo, *Beyond Description: Singapore Space Historicity* 5).

> "It is the created object which thinks us, and which sometimes thinks better than we do, and quicker than we do: which thinks us before we have thought it" (Jean Baudrillard, *The Intelligence of Evil or the Lucidity Pact* 42).

1.1 Post-Cold War Technologies and Technicity: Situating the iN2015 Masterplan

David is very excited and he cannot wait to show his mother, Nancy, the birthday gift he made for her. Earlier today, while on a school excursion to the Singapore Zoological Gardens, he has taken the opportunity to "scan" various animals, insects and plants using a special tablet issued by the school. This tablet not only enables him to call up his virtual "professor" to answer his queries about the flora and fauna at the zoo, but also to share the answers with his classmate, which he did by simply dragging the answer folder towards the direction of his classmate's tablet. In the evening, as the family gathers to have dinner and celebrate Nancy's birthday, David eagerly takes out the memory card where Nancy's gift is stored. He inserts it carefully into a special device with a crystal ball and instantly transforms the family dining room into a virtual "jungle." The immersive environment awes everyone in the family, but David is by now too distracted wondering about the technologies that will be available in the next ten years from his supposed year 2015. David is, after all, the

ideal subject presented (in a video) and valorised by the "Intelligent Nation 2015" (iN2015) Masterplan.

In May 2005, the Info-communications Development Authority of Singapore (IDA) set up a steering committee to spearhead Singapore's ten-year Masterplan called "Intelligent Nation 2015" (iN2015). The vision of the iN2015 Masterplan, according to the IDA website, is to harness the latest information technologies and telecommunications to turn Singapore into "an intelligent nation, a global city, powered by infocomm." Through "innovation," "integration" and "internationalisation," the Masterplan aims to provide businesses and individuals with a conducive space for creative and innovative technological experimentations. It also endeavours to achieve connectivity for fast and efficient harnessing of resources and capabilities among businesses, individuals and communities, and to furnish the Singapore populace with access to the world's resources and the simultaneous export of Singapore ideas, products and services. In short, the iN2015 Masterplan claims to give every individual "seamless access to intelligent technology – and with it – the capability to take charge," as well as the "new freedom to connect, innovate, personalise and create" (IDA, "iN2015 Masterplan" n.p.).[1]

To achieve this ambitious plan, the iN2015 Steering Committee proposed several strategies that require IDA to work closely with various government agencies, "key" industry and business players as well as the public. These strategies include the establishment of "an ultra-high speed, pervasive, intelligent and trusted" wired and wireless infrastructure island-wide, the advancement of sophisticated and innovative

[1] These were the initial words used to describe the iN2015 Masterplan on IDA's website. However, the website's rhetoric was significantly toned down during its revamp in June 2010. In addition, the iN2015 video *Imagine Your World iN2015* was removed from its prominent position on the website. I will address these moves in chapter three.

use of the latest technologies, as well as the development of a globally competitive information communications industry and an equally competitive information communications-savvy workforce. The iN2015 Steering Committee envisioned the iN2015 Masterplan to transform a wide range of sectors, specifically digital media and entertainment, education, financial services, healthcare and biomedical sciences, manufacturing and logistics, land and transport, tourism, hospitality and retail, as well as the realm of government and society (IDA, "Realising the iN2015 Vision" 19). At the same time, it highlighted various technologies that will enable and enhance these sectors. These technologies include communication networks in terms of wired and wireless broadband and mobile services, computing hardware such as embedded multi-core computing, wearable computing (Wearables) and mobile devices, computing software from "intelligent" agents, web-enabled collaborative infrastructures, real-time multi-lingual speech translation software, cryptography, to grid and cloud computing, as well as context-aware "intelligent" systems like "pro-active smart things and environment" (IDA, "Innovation. Integration. Internationalisation" 117-124). Furthermore, as part of the focus on digital media and entertainment, the committee singled out human-computer interaction, sensor technologies, ubiquitous network connectivity, and media management for research and development (67).

The iN2015 Masterplan is Singapore's sixth information technology (IT) master plan that professes to "enrich lives, enhance the nation's economic competitiveness and ability to innovate through infocomm" (IDA, "Realising the iN2015 Vision" 3).[2] As such, the iN2015 Masterplan engages a nation where information technologies and telecommunications already form a prominent part in

[2] For a list of past national IT plans, see IDA "Innovation. Integration. Internationalisation" 33-34.

most people's daily lives, from education to transport, work, and leisure. Under the iN2015 Masterplan, the spread of information technologies and telecommunications will not only be escalated, but their very patterns and structures will be intensified and pervasive computing will play a leading role in structuring the everyday life of the Singapore populace.[3] Pervasive computing is defined as a vision for future applications of information technologies and telecommunications, highly miniaturised and embedded into everyday objects, the environment and even the human body, to allow wireless and "seamless" identification and connectivity. This technological vision is also known amongst pervasive computing researchers as ubiquitous computing and ambient intelligence (Köhler and Erdman 831-852; Bohn et al. 763-785; Hilty, Som and Köhler 853-874). The particularities of pervasive computing include ubiquity and "invisibility" (Weiser 94-104), and particularly for wearable computing, operational and interactional constancy ("always-on"), as well as Artificial Intelligence in terms of situational-awareness and "augmentation" (Billinghurst and Starner 57-64; Mann "Humanistic Computing" 2123-2151).

[3] For example, the iN2015 Masterplan had set targets of 90 percent home broadband usage and 100 percent computer ownership in homes with school-going children but as of this year, Singapore's household broadband penetration rate has reached 103 percent ahead of the 2015 target. Meanwhile, its mobile penetration rate stands at 146 percent, or an average of more than one mobile phone per person (I. Tham "Wired Broadband Services"). Currently, and as part of the iN2015 Masterplan, the broadband network is being upgraded with a high-speed fibre-optic network called the Next Generation Broadband Network. This new network will allow speeds of 1 Gigabyte per second or higher, and is expected island-wide by 2012 (H. H.Chua "All Set to Speed Down Internet Highway"). As of April 2010, thirty percent of the island is wired up with this national high-speed fibre-optic network (H. H. Chua "Ultra-fast Broadband"). In terms of the wireless infrastructure, the S$100 million "Wireless@SG" network that allows subscribers "always-on" and free (until 2013) wireless broadband connections to the Internet in most public spaces across Singapore is completed ahead of schedule with more than 7,500 hotspots and 1.3 million subscribers (Y. Tham "Editorial").

Pervasive computing is hence regarded as being capable of providing access to information “anytime” “anywhere,” and to even act and react according to its user’s environment, filtering information on his or her behalf without any conscious actions and/or awareness on the user’s part. This “seamless ease” of use is certainly in line with the objectives of the iN2015 Masterplan. As the iN2015 Steering Committee pointed out, “iN2015 sets out to deliver on this promise of infocomm for every individual and business in Singapore. To do this, infocomm must not only be easy to use, it needs to be intelligent enough to cater to the needs of every user,” from “infocomm-savvy computer graduate” to “the elderly” (IDA, “Innovation. Integration. Internationalisation” 3). Moreover, Dr Lee Boon Yang, then Minister for Information, Communications and the Arts, claimed that the iN2015 Masterplan is also about developing “an inclusive digital society” in which information technologies and telecommunications is made “even more accessible to everyone – to work, live, learn and play with” (2).

Ensuring the proliferation of information technologies and telecommunications, however, is not as neutral or positive as it seems. This is especially so with pervasive computing, where highly miniaturised technologies are embedded into everyday objects and environments to mediate everyday life ubiquitously, constantly and invisibly. Ryan Bishop, John Phillips and Wei-Wei Yeo point out, in *Beyond Description: Singapore Space Historicity*, that architecture is not a benign entity and/or activity; it vitally produces space. Space as conceptualized not only in the literal but also in the figurative sense – spaces of thinking, interaction and dwelling that are inseparable from technologies of speed. In the case of Singapore, the authors maintain, these technologies of speed are reproduced and developed as part of a general discourse on efficiency and productivity that at the same time erases

positions and facts contrary to its sense of benign progress (5-6). Such instances point to the intertwined relationship between the literal and figurative, how the built spaces of Singapore (or what is empirical, material) cannot be separated from its "un-built" spaces (or what is invisible, immaterial). In fact, the authors argue that the un-built provides the condition of possibility for both literal and figurative conceptions and experiences of spaces. They contend:

> The built, of course, designates both the concrete structure and the various manifestations of its conception: plans, models, and blueprints. But for the design to have been possible one must consider the undetermined and thus un-conceptualized possibilities against which a design is always made. In this exact sense the un-built corresponds to that notion of space that constitutes the condition of possibility for both literal and figurative conceptions and experiences of it. (6)

The iN2015 Masterplan's objective to turn Singapore into "an intelligent nation, a global city, powered by infocomm," therefore cannot be divorced from the larger national discourses on efficiency and progress, including the way Singapore narrates or broadcasts itself, its creation of the needs for perpetual capitalist and technological developments, and its rhetoric of technological neutrality, empowerment, control and inclusion. Simultaneously, these national discourses cannot be isolated from history, globalisation and its technologies which extend before the birth of Singapore and beyond its shores. In other words, Singapore's context as an ex-British colony, its geopolitics as a small city-state with a majority "Chinese" immigrant population in Southeast Asia obsessed with race-relations

within itself and with neighbouring states, and its ambition to be a global city entail a continuous, complex and strategic engagement with colonialism, post-colonialism, globalisation and, fundamentally, Cold War technologies and technicity.

Singapore is one of the smallest countries in Southeast Asia with a land area of 714.2 square kilometres. It comprises an ethnically diverse immigrant society and has a current total population size of close to 5.2 million people, of which 3.3 million are Singapore citizens.[4] Prior to achieving self-governance in 1959 and independence in 1965, Singapore was part of the Malay Peninsula and a British colony. Despite its small size and lack of natural resources (compared to its neighbours), Singapore's geographic location as a gateway to both the Indian and Pacific Oceans made it a strategic British trading centre and military base. Its majority immigrant population depended on the British for defence until the latter's withdrawal in 1971. Against the backdrop of volatile race relations with its immediate neighbours Malaysia and Indonesia, coupled with a deep sense of vulnerability and insecurity, the founding of Singapore also coincided with the Cold War rivalry between the United States of America and the Soviet Union. Ultimately, Singapore's defence and foreign policies sided with the United States as the power crucial for its survival and the (continuation of?) peace and security of Southeast Asia (Singh, *The Vulnerability of Small States Revisited* 215-221). To this day, the Singapore-US link is still considered of paramount importance to Singapore's security as the latter continues to supply Singapore with advanced military weapons and systems, together with training facilities in America. In return, Singapore remains a key transit point for American ships and aircraft (Singh *Arming the Singapore Armed Forces* 19).

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[4] Department of Statistics Singapore <http://www.singstat.gov.sg/stats/keyind.html>.

The strong ties with America extend beyond security and trade, and are not limited to only material exchanges, but also include the transfer of ideologies and doctrines. Prasenjit Duara, in "The Cold War as a Historical Period: An Interpretive Essay," points out that the United States, quite different from the Soviet Union, adopted a form of imperialism that is based more on indirect control through notions of limited self-determination and tutelage. This development-oriented imperialism no longer emphasised conquest; rather, it imposed through clientelistic structures based on modernising designs of enlightenment, such as fostering discourses on multiculturalism, development and modernisation. It also obtained informal control of key infrastructure and political institutions of the client states whereby the latter became "militarily dependent upon and economically mobilized for the sake of the metropole" (461). Ultimately, the United States' strategic reorientation of the periphery, designed to attain global supremacy for itself, was sustained by, as much as it sustained, a vast military-industrial-complex. As a result, the crucial consequences of the Cold War on client states were not only constraints on imagination, old and new aspirations, but also the militarisation of the everyday (470).

Similarly, Bishop and Phillips' *Modernist Avant-Garde Aesthetics and Contemporary Military Technology* argues that Singapore's move from the colonial to post-colonial contexts should not be seen as simply a transition from one condition to another. Rather, it should be understood as a transformation that very often retains and repeats fundamental elements of colonialism, such as the (post)colonial military body. The authors contend that the post-colonial moment in Southeast Asia is inextricable from the Cold War, its technologies and technicity, although this is often obfuscated by post-colonial discourses on nation building (120-123). Singapore's nationalist project and its current transformation to a global city exacerbates the

necessary exposure to the exigencies of Cold War technologies and technicity, which have accelerated in the post-Cold War world under global capital and the global "war against terror." As Bishop continues to observe, Singapore's ambition to be a global city amongst the various global orders necessitates its embrace of the historicity and technicity of C^3I, and this embrace is demarcated in every dimension of its urban landscape to the extent that the divisions between the military, economic, and political domains are remarkably fluid and fold into each other as the need arises ("The Vertical Order Has Come to an End" 62).

C^3I – Command, Control, Communications, and Information/Intelligence – is one of the most notable applications of cybernetics, military technologies and technicity that emerged from the Cold War. As we enter the twenty-first century, C^3I is increasingly being overtaken by C^4ISTAR – Command, Control, Communications, Computers, Information/Intelligence, Surveillance, Target Acquisition and Reconnaissance.[5] C^4ISTAR, premised on capabilities and systems that are networked in such a way to provide military commanders situational awareness in the form of fast and "accurate" information and intelligence, is believed to be necessary for achieving (though not guaranteeing) accelerated decisions during combat. The modification in acronym from C^3I to C^4ISTAR is in itself significant and signals an intensification of the role information technologies and telecommunications play in warfare, and their impact on the larger transformation within militaries at the doctrinal and organisational levels, as they sort to adjust to the post-Cold War era of an ever-changing security landscape. These doctrinal and organisational changes in militaries

[5] C^4ISTAR is the term used in the British context. The American equivalence is C^4ISR – Command, Control, Communications, Computers, Information/Intelligence, Surveillance and Reconnaissance. C^4ISR is also used by the Singapore Armed Forces, however, for this dissertation, I will keep to C^4ISTAR as the theme of target and targeting remains relevant for my arguments.

are encapsulated in the Revolution in Military Affairs (RMA), introduced by the influential Washington think-tank in 1993, which underpins today's Network-Centric Warfare (NCW).

At the doctrinal level, RMA proposes a shift from the massive, heavy armies of the Cold War that fought "in place," to lighter more deployable armies that can be operational around the world in times of war and humanitarian crises. It argues that in the post-September 11 climate, the strategies of deterrence and containment are inadequate and need to be complemented with pre-emptive strikes, that is, going to the "threats" and dealing with them as far away from the homeland as possible. Mobility, adaptability and flexibility are thus essential requirements of highly dispersed forces so that they can move and respond to changing situations, rapidly and precisely. RMA also calls for "jointness," which is the ability of the air force, army and navy to operate as one, overcome incompatible hardware and software, and move from a platform-centric to network-centric warfare (Sloan 5-7). At the organisational level, RMA demands the creation of smaller units (though not necessarily force size) that can be added or deleted from the network architecture according to need (Mitchell 35-37). These units are made up of highly qualified, trained, educated personnel who are high-tech savvy, and able to work beyond the nation's shores (Sloan 7).

The transformation that is taking place in the post-Cold War era, however, should not be taken as a drastic break from Cold War technologies and technicity. Elinor Sloan, in *Military Transformation and Modern Warfare*, points out that RMA is itself an adaptation of the Soviet's Military Technical Revolution (MTR) of the late 1970s and 1980s (*viii*), just as the notion of "jointness" was already apparent in the Normandy landings during World War II that involved both land and sea power (27).

The display of American technologies and technicity in the 1991 Gulf War, moreover, is a culmination of their research and development in war games and simulated exercises throughout the 1980s (2). I concur with Sloan's observation that in thinking about military technical revolution, it is more useful to conceive of these changes as "a series of concentric circles, each progressively more expansive but each continuing to encompass the earlier core or cores" (*viii*). Furthermore, I would like to extend this notion of expansion, that retains an earlier core, to the rest of my discussions on pervasive computing and the iN2015 Masterplan such as how they continue to embody total war strategies and Cold War techniques and technicity.

By total war strategies, I am referring to the structure and heuristic frameworks founded in 19th century Europe that left an indelible mark on modern warfare, specifically, the decentralisation efforts of the French and Napoleonic Wars, when there was, for the first time in warfare, less differentiation between combatants and civilians. By referring to Cold War techniques and technicity, I am pointing in particular to the covert propagandist strategies of appealing to the hearts and minds of the people in support of war efforts. These strategies, I argue, are still present in post-Cold War Singapore today, albeit in more intensified yet imperceptible ways. Additionally, the three core points I observe in this dissertation are:

1) The persistence of central command and control, despite decentralisation and the move towards networks and distributed ways of thinking and doing things.
2) The significant role of discourse (signs, rhetoric, visions) in shaping things, situations and thoughts, even as we enter an era where notions of "truth" and "reality" are no longer tenable.

3) The spiralling interplay between the material and immaterial in the constitution of technological spaces and technological subjects, and how they feed back into each other.

In this sense, I would like to keep Bishop and Phillips's understanding of technicity as a complex, multi-layered condition that implies, firstly, the privileging of practical methods and results and, secondly, the intensification of the active technicisation of all aspects of everyday life. Last, but equally important, technicity also implies a condition that develops its own momentum, spiralling beyond human control, as more technical innovations are used to deal with unforeseen consequences of earlier technical introduction, yet producing their own sets of problems/solutions further down the line (Bishop and Phillips, *Modernist Avant-Garde Aesthetics* 105). I understand that to make sense of this technicity will require a constant looking back at history, examining the links between the iN2015 Masterplan, pervasive computing and their larger connections to past and present events and, pivotally, the mutually constitutive relationships between language, thought and technology. My insistence on historical connections should not be mistaken by my readers as attempts to naturalise or universalise the phenomena I am studying. Quite the contrary, my focus on historicity is to stress how pervasive computing and the iN2015 Masterplan did not develop out of a vacuum, but are parts of a larger network of things, situations, choices and discourses.

1.2 C^4ISTAR Techniques and Technicity: The Relationships between Technology, Discourse and Embodiment

C^4ISTAR technologies and technicity, which underpin the current transformation of the Third Generation Singapore Armed Forces (3G SAF) into a network-centric, knowledge-based fighting force, are synonymous with pervasive computing and equally fundamental to the iN2015 Masterplan. Singapore's unflinching embrace of post-Cold War technologies and technicity are regarded by many as a "natural progression" of its modernisation and globalisation programme. Indeed, her rapid rise since gaining independence in 1965 into a prosperous nation and success as one of the world's most efficient and "clean" city-states has generated admiration from many. However, these achievements have also resulted in an unquestioning faith in technologies and their capacities, encouraging a certain hubris and "blindness" to the polluting effects of these technologies. Bishop, Phillips and Yeo highlight the electromagnetic pollution that comes with information technologies and telecommunications, in terms of how they reorganisation human experience and spatial relations, and how the virtual shapes and impacts actual conditions of experience and the political economy. Critically, the authors emphasise how this "blindness" is created by a discourse on the supposed immateriality of electromagnetic networks and a binary between the "clean, post-industrial global urban site and the dirty, industrializing sprawl of developing cities" (*Beyond Description* 14-15).

The production of "blindness" is, in fact, part of and proper to C^4ISTAR technologies and technicity in several ways. Paul Virilio, in his studies of the relationship between war, cinema, and what he calls dromology, argues that there is a synchronicity between the war machine and representation that makes war weapons

not just tools of destruction, but also of perception (*War and Cinema* 6). The logistics of military perception, he points out, involve not simply targeting in terms of ubiquitous surveillance, simulation and the replacement of war objects with pictures and sounds, but also the directing of propaganda to the civilian population (1-4). Therefore, Virilio suggests, the first victim of war is always the concept of reality (33), just as the political economy rests on the persistence of signs and dominant trends, rather than on mere facts (80). However, apart from discourse and signs producing "blindness" under the logistics of military perception, the negative aspects of information technologies and telecommunications are rendered invisible also by the speed of these machines. According to Virilio speed that results from miniaturisation and ubiquity is causing the disappearance of places and human consciousness, and consequently the dissimulation of people and bodies (Virilio and Lotringer 98-102). Speed, as it mediates human actions in picoseconds, is leaving little space and time for human reflections, making them "blind" to the technologies' potential for violence and accidents. Virilio warns that the question of technology is not only about the substance, but also the accidents manufactured, since "[e]very technology produces, provokes, programs a specific accident" (46). Furthermore, he reminds us, speed is an environment, a domain with specific properties, defined in equal measures by time as they are by space (*Virilio Live* 61). Hence, as speed increases, control over cities also increases in the hope of anticipating the future or what is coming (62-63).

The iN2015 Masterplan's establishment of a nation-wide "ultra-high speed, pervasive, intelligent and trusted" infrastructure, therefore, entails a spread of information technologies and telecommunications and a simultaneous increase in the integration of all aspects of Singapore society under the central command and control of not only the government and its military, but also the technologies and their logic.

At the same time, this is achieved through a constant tight control over the perceptions of these technologies. Through discourses that stress the positive aspects of the technologies, and present the negative aspects as avoidable and/or controllable, these technologies appear neutral and ultimately empowering, despite their potential for violence and accidents. So, the persistence of equating technology with progress or as the only reliable source for improving the human condition is due, in no small part, to the historical and definitional understanding of technology as a tool. In this regard, any setbacks are attributed to socio-cultural misuse rather than to the technology itself. Technology then is seen as inherently value-free and only obtains its particular socio-cultural meaning and moral standing depending on where and how it is put to use (Winner, "Technologies as Form of Life" 103-113). However, simply understanding technology as socially constructed (in the limited sense of instrumentality) is not enough to recognise the hold of technology over humans. Such a position disregards particular features or designs within the technology which provide structure for human activities that, in turn, encourage specific patterns of power by favouring certain social interests and groups (Winner, "Do Artifacts Have Politics?" 289-302). It also neglects how technology fundamentally shapes our thoughts and structures our ways of being. Virilio's insightful observation of the relationship between discourse and the techniques of the war machine is therefore instructive for this dissertation. In critically analysing the discourse of the iN2015 Masterplan and its technologies, I must also focus on their techniques and technicity.

Philosophers and theorists of technology have argued that technical devices and systems are not neutral, but shape our culture and environment, alter human activities and thereby, influence who we are and how we live. Martin Heidegger in his work "The Question Concerning Technology" (311-341) suggests that technology is

not simply a benign object. He argues one of the most important aspects of human's ordering and driving of technology forward is their becoming "blind" to technology's essence. Heidegger states that "we are delivered over to it in the worst possible way when we regard it as something neutral; for this conception of it, to which today we particularly like to pay homage, makes us utterly blind to the essence of technology" (311-312). The essence of technology, for Heidegger, is nothing technological; rather, it refers to the human attitude and/or enframed mind that regard technology simply as a means to an end, and/or as inevitable. In other words, the essence of technology is the enframed mind that sees technology instrumentally, solely as an extension of human activity and a mere tool that humans are in control of when, in fact, technology is capable of manufacturing its own reality. This instrumental and anthropological conception of technology, Heidegger further points out, leads to an "un-free" relationship with technology as it requires a constant need for mastery and control over it. Enframing is hence one of the "truths" generated by technology and is dangerous because it not only rules out other ways of being and seeing the world, but also makes humans "blind" to its revealing or destining (333).

Although Heidegger may come across to some as being too technologically deterministic, I hesitate to throw out the baby with the bathwater here as his notion of enframing remains relevant for this dissertation.[6] One way of understanding how technology structures human thoughts through activities is by looking at the relationships between technology, discourse and embodiment. Heidegger points to the inextricable relationship between language, thought and technology by highlighting

[6] Haraway, for example, sees Heidegger's "The Question Concerning Technology" as dogmatic, but as her interviewer, Goodeve, points out Heidegger's thinking and questioning of the technological was within the historical context of war, fascism, and technology being intricately entwined (*How Like A Leaf* 22-23). As I will show in this dissertation, war, totalitarianism and technology today are still closely entwined, albeit in subtle ways, which is why I find Heidegger still relevant.

how they draw from the same root. He highlights how the Greek word for technology – *techne* – suggests not only "activities and skills for the craftsman but also for the arts of the mind and the fine arts" (318). In this sense, skills, language and technology are mutually constitutive (or language is a technology) that, in turn, pivotally shape human thoughts and subjectivities. This is certainly the case with how computers shape patterns of thoughts, while Cold War ideologies and politics simultaneously shape their technical design. Paul Edwards in *The Closed World: Computers and the Politics of Discourse in Cold War America*, looks at how the digital computer played a central role during the Cold War not just physically as a tool, but also metaphorically in shaping its discourse and ideology. In turn, the computer functions as an embodiment of Cold War related ideas of information, symbols and logic (*ix-x*). He argues that "tools and their uses thus form an integral part of human discourse and, through discourse, not only shape material reality directly but also mould the mental models, concepts, and theories that guide that shaping" (30). In short, Edwards points to how ideas and devices are intertwined with politics and culture, and how these manifest in their mutually constitutive discourses. He argues "tools shape discourse, but discourse also shapes tools" (30).

Another way to understand how technology structures human thoughts through activity is provided by Don Ihde in "A Phenomenology of Technics" (137-159). Ihde contends that our interaction with technology is also a bodily engagement – an existential technical relation with the world. In other words, this embodied relation with technology entails activities that need to be learned or constituted. Techniques, then, imply "the symbiosis of artefact and user within a human action" (138). Essentially, Ihde continues, technology as it extends human's bodily capacities also transforms them. Hence technology is not neutral as it changes the basic situation,

however subtly. Ihde gives the example of the telescope that greatly extends human's sense of sight, which paradoxically also led to a reduction in sight because, "what is *revealed* is what excites; what is concealed may be forgotten" (142). Therefore, Ihde concludes, "there are *latent telics* that occur through inventions" (142).

This brings me back to the point made by Virilio about the "blindness" produced by the relationship between discourse and the techniques of information technologies and telecommunications. In this dissertation, "blindness" means disavowal, ignorance and/or forgetfulness (intentional or otherwise) that result from both the latent *telics* of pervasive computing and the optimistic discourse surrounding the technology that are, in turn, productive of the continued development of the technology. Hence, this dissertation will demonstrate that pervasive computing's inherent capacity for abstraction, surveillance, speed, and control are products of the historical mix of techniques and technicity from liberal trade, scientific developments and military strategies. At the same time, the technology's discourse on efficiency, freedom, empowerment, connectivity and machine "intelligence" are productive of the current intensification of C^4ISTAR technologies and technicity, underpinning global capital networks and the network-centric transformation of Singapore's military. Furthermore, I will show that the proliferation of these technologies and their uses, in turn, are structuring human thoughts and discourses according to the machines' logic, such as how the prototypes and discourses of pervasive computing and the iN2015 Masterplan repeats total war strategies and Cold War techniques and technicity, while the active technological subjectivities they extol and shape, simultaneously mirror global capitalist neo-liberal ideologies. Far from being a simple coincidence, the synchronicity of discourse between pervasive computing and the iN2015 Masterplan, here points to how the logic of the technologies are enframing

thoughts that are then used effectively to ensure their continuous research and development in a continuous cycle, feeding back into and reinforcing each other.

The iN2015 Masterplan embodies the current networked context of post-Cold War technologies and technicity, which in turn demands the production of active technological subjects needed by both the military and technological economy. The technological economy or informational society sums up the overlapping realms and mutually constitutive forces of politics, economics, and information technologies and telecommunications. What results is a particular way of life, variously described as the post-industrial/post-Fordist society, knowledge-based economy, network society, new economy, cultural economy and economy of signs; but what links them all is the generation, through innovation and creativity, of new knowledge and immaterial goods, regarded as critical for the survival of the economy (Barry and Slater 1). Therefore, just as the iN2015 Masterplan's establishment of pervasive information technologies and telecommunications is not neutral, its objective of a "digitally inclusive society" is equally not as benevolent as it seems.

1.3 Society of Control Meets Consumer Society: Singapore in the Age of "Mutated Capitalism"

In "Postscript on the Societies of Control" Gilles Deleuze asserts that the disciplinary societies of the eighteenth and nineteenth centuries expounded by Michel Foucault are increasingly being superseded today by complex societies of control (35-39). The latter operate through a sophisticated combination of what Deleuze calls "mutated capitalism," information technologies and telecommunications, and their feedback loops. Under mutated capitalism, there is a shift from capitalism's focus on material production to the dispersive "higher-order production" of information and services,

which, in turn, require complex forms of control through information technologies and telecommunications and their feedback loops (Deleuze 38). According to Deleuze, some key features of societies of control include the proliferation of digital technologies and their logic; the modular rather than discrete forms of operation and control; the supremacy of code or password over the signature or watchwords; and the conversion of individual and masses to ‘dividuals’ (39).

In other words, unlike the disciplinary powers that are exerted on individuals as they move through discreet forms of institutions, like schools, factories, clinics, prisons, military, et cetera; social control in societies of control is diffused, no longer independently confined within a single entity and/or institution, but becomes modular through digital technologies which plug into each other) and, therefore, are perpetual. Deleuze observes, “control is short-term and of rapid rates of turnover, but also continuous and without limit, while discipline was of long duration, infinite and discontinuous” (38). Furthermore, this shifting, modular, and insidious form of control presents rivalries and competitions as excellent motivational forces to be emulated while perpetual training (following the logic of digital technology and perpetual innovation) is made an essential part of life. With the dispersal of information technologies and telecommunications, the individual (signature) and his or her position within the mass do not matter as much as his or her access (code or password) to information. In this context, the distinction between the individual and masses becomes less consequential since they can all be transformed into active data to fuel the current digital form of production intrinsic to mutated capitalism.

The Singapore government, apart from building and deploying the necessary infrastructures and technologies, has always ensured that its education and training systems are geared towards the needs of its political economy. The iN2015 Masterplan continues this well-coordinated effort to align the deployment of education to the needs of mutated capitalism. As such, the iN2015 Steering Committee recommended several strategies to encourage the sophisticated and innovative use of the latest technologies, which will in turn help develop the 'infocomm-savvy workforce' and 'globally competitive infocomm manpower' it needs. Specifically, they identified two ideal subjects to be nurtured for the technological economy – 'the techno-strategists who have the ability to combine technical know-how with domain experience to develop innovative solutions' and 'the technologists, who need to be equipped with deep technical expertise to engage in R&D [Research & Development]' (IDA, "Innovation. Integration. Internationalisation" 61). These subjects are also expected to have "strong analytical, communication and interpersonal skills," able "to be more risk-taking, entrepreneurial and … tolerate greater ambiguity" (70); in short, innovative, neo-liberal, technological subjects.

David Harvey, in *A Brief History of Neoliberalism*, elucidates neo-liberalism as a theory of the political economy that proposes that human well-being is best advanced by encouraging individual entrepreneurial freedoms and skills within an institutional framework of strong (intellectual) property rights, free market and free trade (2). Here, the neo-liberal assumption is that individual freedoms are guaranteed by the liberation of the markets (7). Therefore, according to Harvey, neo-liberalism ultimately works on an ethics that brings all human actions and domains into relation with the market, while negating or erasing other ways of living and being in the

world. Today, neo-liberalism operates and is dependent on information technologies and telecommunications to create, accumulate, store, transfer, and analyse informational goods and services essential to the informational society (Harvey 3-4). Furthermore, just as Cold War technologies and technicity pervade a wide range of architectural and spatial practices, neo-liberalism similarly permeates influential spheres from education and media to key national and international institutions. Harvey argues that neo-liberalism has become "hegemonic as a mode of discourse … [and] has pervasive effects on ways of thought to the point where it has become incorporated into the common-sense way many of us interpret, live in, and understand the world" (3).

Key to the successful spread of neo-liberal thought or values is a complex mix of implementation and enforcement of neo-liberal policies by western industrial nations in the 1970s (Harvey 16, 23), and the programmatic advancement of the neo-liberal cause through the media, universities, think tanks and civil society groups funded by corporations (40, 44, 54). However, more fundamentally, the expansion of neo-liberal thought is in the grounding of its discourse on concepts of "human dignity" and "individual freedom" (5) which simultaneously obfuscate its ultimate objective of capital accumulation and the restoration of power to the economic elites (19). The tensions between neo-liberal ideals and its actual pragmatics, Harvey continues, extend also to the neo-liberal supposed distrust of all state powers that, ironically, are needed to enforce and protect the rights of (intellectual) private property, individual liberties, and entrepreneurial freedoms (21). Harvey notes that although neo-liberalism is fundamentally about the restoration of economic power, it does not necessarily return power to the same people. Instead, it rewards those intimately tied to capital, including a new disparate class of key capitalist operators

and leaders in the corporate, financial, legal, scientific, technical, media and, I add, educational sectors, who are now connected by their common belief in neo-liberalism (31-36) and in their shared stakes in the perpetuation of neo-liberal values. It is not difficult to see why there is strong enthusiasm and support for the iN2015 Masterplan not only from industry and business players, but also from the public. Pivotally, the iN2015 Masterplan's discourse of technological empowerment repeats the neo-liberal strategy of translating desires for liberation into the "liberty of consumer choice," not only in terms of products, but lifestyles, ways of expressions (42), and ultimately modes of being.

Jean Baudrillard, in the "The System of Objects" (13-31), "Consumer Society" (32-59), and "Marxism and the System of Political Economy" (131-177), elaborates on a new humanism where competition has moved from the realm of production to consumption, and where subjectivity and freedom are performed through consumption. Under the mutation of capitalism, consumer objects (including digital media) form the code through which an arbitrary system of classification and value is assigned, and this code then provides a false transparency of social standing and social relations; its network of signs incites desires and creates needs. According to Baudrillard, needs here refer specifically to the desire for difference or social meaning, and since needs are created from a code of floating signifiers, they can never be satisfied. This, in turn, makes consumption limitless and therefore a good form of social control. In other words, Baudrillard is pointing to the political economy of the sign in shaping needs and desire, and how consumption of signs and objects (and, therefore, of codes) remains vital for the reproduction of mutated capitalism. He states, needs are "produced as a *force of consumption*, and as a general potential reserve within the larger framework of productive forces" ("Consumer Society" 45).

Hence, Baudrillard argues, production and consumption are two sides of the same coin, they are one and same logical process of productive forces of control. Technological consumption under the iN2015 Masterplan then becomes a 'citizen's *duty*' (51) that needs to be performed in the service of the nation and the neo-liberal technological economy.

Since information technologies and telecommunications are fundamental to the operations and success of mutated capitalism, ensuring its consumption (and thus production), is of central priority for the iN2015 Masterplan. Whether it is in the development of a competitive information communication-savvy workforce for the political economy or ensuring a "digitally inclusive society," the iN2015 Masterplan intensifies the consumption and production of these technologies for *all*. Apart from the construction of pervasive infrastructures, enacting policies and harnessing the educational system, innovative neo-liberal technological subjects are also produced through the coding of needs and desires. The merging of post- Cold War technologies and technicity with neo-liberal values and rationality, indeed, are resulting in complex societies of control and Singapore is one good example of such a society.

Admittedly, Deleuze and Baudrillard do not always see eye to eye in terms of their strategies for dealing with mutated capitalism, especially in terms of their positions on productive desires. Although Deleuze (and later with Felix Guattari) points to the twin forces of machinic and capitalist systems as insidiously structuring subjectivities under their logic of consumption and (social, moral and digital) codes, he nevertheless sees technological embodiment panning out differently for different bodies, largely depending on how information technologies and telecommunications are harnessed. In *Anti-Oedipus: Capitalism and Schizophrenia*, Deleuze and Guattari recast desire, not as a lack like conventional psychoanalytic postulations, but as an

active and positive force that can be harnessed to change structures. According to the authors, nature is a process of production and there is no distinction between production and consumption, as well as between man and nature (3-4). Hence, Deleuze and Guattari formulate the body-as-desiring-machines that are continually producing, consuming, yet, at the same time, processual (becoming) and thus full of potentials. The authors propose a move away from the body-as-desiring-machines that only creates more desires and suggest instead the assumption of the "body without organs" that belongs to the realm of both production and anti-production (6-8). "Body without organs" can then appropriate desiring-production for its own use; in their case, for anti-capitalist revolution (11).

Baudrillard, however, in "The Mirror of Production" (102-130) argues that the "productivist discourse" that engages productive desires, in fact, is a "*mode* of production" that leaves the "*principle* of production" intact (102).[7] Such revolutionary calls not only (to?) simulate radical alternatives, but also point to the limits of critical thinking that cannot move outside or beyond the dominant schema of capital and the political economy that is production (103). Baudrillard adds that under such productivist calls for liberation, humans stop "being" themselves and mirror the political economy by "producing" themselves as visible value, while confusing the liberation of productive forces with their freedom ("Mirror of Production" 103-106). According to Baudrillard, the false dichotomies created by productivist discourse,

[7] In *Forget Foucault*, Baudrillard points to Deleuze's positive dissemination of flows and intensities as a direct result of Foucault's power, which he formulates along the same operational line as desire that then allows Deleuze to develop the notion of desire along the line of future form of power (35-36). Pivotally, both discourses function on *pro-duction*, not in the sense of material manufacture, but in the original sense of *pro-ducere*, that is, to render visible, cause to appear. Furthermore, Baudrillard suggests that Deleuze's molecular topology of desire colludes with science and is complicit with cybernetics in their eventual convergence in genetic simulation and code manipulation (46-47).

between use value and exchange value, labour power and products of consumption, are effects of the code, which leaves the political economy's condition of possibility – the rationale of productive subjectivity – unchallenged ("Mirror of Production" 108-109). Baudrillard reiterates that behind the concept of consumption are the anthropological codes of needs and use value, which join with production to become a productive force in shaping subjectivities in material production to satisfy those needs ("Mirror of Production" 105). For him, "the system of the political economy produces not only the individual as labor power sold and exchanged, it produces the concept of labor power as the fundamental human potentiality" ("Mirror of Production" 113). This, in turn, leads to "not only the quantitative exploitation of man as productive force by the *system* of capitalist political economy, but the metaphysical over-determination of man as producer by the *code* of the political economy" ("Mirror of Production" 113).

This is why for Baudrillard the main repercussions of the mutation of capitalism, besides its departure from material production and its reach and subjection of everything and everyone under the system of exchange value, remain at the level of social relations ("Marxism and the System of Political Economy"138-139). The movement from the commodity form to the sign form, from material to digital, shifts the law of exchange under general equivalence to the "operationalization of all exchanges under the law of the code" ("Marxism and the System of Political Economy" 140). He warns that under the "hegemony of the code," control and power is "much more subtle and more totalitarian than that of exploitation" ("Marxism and the System of Political Economy" 140). This is because under this new ideological structure, the code engages productive energy, manipulates minds and produces meanings and differences that no longer refer to any objective or subjective "reality,"

but only to its own logic, that is, the disappearance of its use value "to the benefit of its commutation and exchange value alone" ("Marxism and the System of Political Economy" 146).

It is beyond the scope of this dissertation to probe this tension between Baudrillard's argument and Deleuze and Guattari's position in depth, except to say that while Deleuze and Guattari's desire for anti-capitalist production can be arguably an effect of the very systems they are targeting, Baudrillard's opinion of the principle of production, if taken too intact, becomes too pessimistic, total, and leaves no room for manoeuvring. I take the position that Baudrillard's as well as Deleuze and Guattari's observations remain at the forefront for contemplating and critiquing the current post-modern, post-industrial, globalised arrangement, even though their views were expressed well before the twenty-first century. In addition, despite the differences in their approach to production, they nevertheless do share similar views of the threats to the individual and radical singular thought posed by the complex infrastructure of mutated capitalism.

1.4 The Paradoxical and Reversible as Methodology: Situating My Thoughts and Mapping My Journey

The use of theories in this dissertation is admittedly eclectic and, at times, contradictory. This is because as I work through concrete examples and phenomena, I am mobilising theories that I feel are most directly relevant to help think them through. At the same time, these contradictions also reflect on the empirical situations that ultimately no theory is ever comprehensive enough to explain. For example, even as Deleuze describes societies of control as *replacing* disciplinary societies, the case of Singapore shows that very often this is not fully the case. The situations of how the

government here uses the educational and legal systems to constitute technological subjects, show that Louis Althusser's ideological state apparatuses, even if it is a structural theory, remains relevant to my discussion (in chapter five). In the context of Singapore, the closed command and control specific to disciplinary societies co-exist with the rapid, fluid, free-floating control articulated by Deleuze.

Nevertheless, one central theory that structures and runs through the entire dissertation is Baudrillard's theory of the object. In *Passwords*, Baudrillard describes the object, not simply as a manufactured thing, but as something that speaks, and speaks to each other, developing systems of signs beyond what humans intend for it (3-5). So while humans regard objects as dumb and inert because we produce them, as Baudrillard sees it, objects have autonomy, they can seduce and have the capacity to avenge themselves on the subjects over-sure of controlling them. This is because objects operate on symbolic and semiotic levels, forming systems of codes (social, moral and digital) that structures the way we think and how we live our lives. At the same time, because objects are ambiguous – they mediate and yet are immediate and immanent – they both gratify and disappoint, moving beyond the codes, meanings and definitions imposed on them. Working on both dual and duel relations, objects are thus reversible, with the potential to break the cyclical. Here, the reversible is anti-determinism, the built-in ability of objects and systems to undermine themselves by their very functioning. Therefore, objects, for Baudrillard, provide the potential to break from control and from the subject, both of which are intensifying under mutated capitalism.

In this regard, I would like my readers to view this dissertation as a performative object within a system of objects. This dissertation is performative in not only mapping my thoughts and journey, but also in shaping them in return. This

dissertation, at times, mirrors the almost totalitarian account of Singapore in its critique, even as it strives for the paradoxical and the reversible. It is a part of but also departs from discourse, in the Foucauldian sense of its relations with power and the production of "truth." Foucault observes the manifold relations of power that pervade society which, in turn, constitute the social body through their production, accumulation and circulation of a functioning discourse. He argues, "there can be no possible exercise of power without a certain economy of discourses of truth which operates through and on the basis of this production" (*Power/Knowledge* 93). In this sense, this dissertation acknowledges Foucault's point on the intertwined relations between the material and immaterial, as well as in the productive, accumulative and circular function of discourse. Yet, it wants to depart from Foucauldian discourse in its attempts to move away from dialectics and the search for "truth" or "reality" and/or any kind of subject position. This dissertation embraces and relies on rhetoric, according to Roy Sellars' point that "rhetoric teaches one how to begin, even or precisely when beginning seems impossible" ("Rhetoric" 59). It engages persuasion that is at the same time contingent on context in the sense where "one already is" and that there is "nothing outside context" (59). This situated thinking is akin to Baudrillard's position, which he clarifies in *Passwords*:

> [T]he inalienable presence of that undecidable does not lead me to an unsituated thinking, concerned only with abstract speculation and with manipulating ideas from the history of philosophy. I attempt to free myself from a referential, teleological thinking precisely in order to pursue the play of a thinking which is aware that something else thinks it. (91-92)

He concludes, “thought must play a catastrophic role … in a world that wants absolutely to cleanse everything … But it must at the same time remain humanist, concerned for the human, and, to that end, recapture the reversibility of good and evil, of the human and the inhuman” (*Passwords* 92). And so, this dissertation ultimately performs the dual form of thought, the world that thinks it, and the resistance to the inhuman.

As a way of situating my thoughts, and this dissertation within a system of objects, I begin chapter two by looking back at my earlier wearable artwork called the *Smart Apron*. The *Smart Apron* was realised outside Singapore, under the auspices of the “Artist-in-Labs: Processes of Inquiry” art residency programme that places artists from several countries into various science research centres in Switzerland. It consists of two sets of aprons that incorporate a range of sensors and telecommunication technologies intended as a metaphor for “empowering” certain foreign domestic workers in Singapore. The main objectives of the *Smart Apron* were, through the use of a well-designed and technologically “enhanced” apron, to present housework as professional work and hence to remind people to accord the persons doing it respect and dignity. Secondly, through particular features of the apron, to highlight specific problems faced by certain foreign domestic workers in Singapore.

Using the *Smart Apron* as a technological probe of my feminist politics and of wearable computing, I complicate my belief in technological “empowerment” by comparing and contrasting the discourses of Steve Mann and Donna Haraway. I focus on Mann because not only is he an artist, he is also a pioneer and leading figure in the research and development of wearable computing. Furthermore, his claims of personal empowerment in wearable computing “inspired” me to think that foreign

domestic workers can equally be "empowered" through the *Smart Apron*. I draw on the discourse of Haraway because her feminist politics of situated knowledges exemplify my feminist concerns for a responsible, accountable feminist politics that is aware, at the same time, of its complicit relationship with technology in the context of the "homework economy" ("A Cyborg Manifesto" 304). Eventually, the *Smart Apron* also complicates itself as complicit in its role as "immaterial labor" – the interface between production and consumption, not only of information, but also of active subjects in the consumption of science and technology (Lazarrato 138). In my critique of the *Smart Apron*, I also gesture to the challenges feminist politics face within the integrated circuit of empowerment.

Feminist projects of valorising cyborgian subjectivities, in fact, are in line with the needs of the current political economy. Singapore's case is instructive in terms of how women are used metaphorically and materially to meet the needs of its technological economy. Chapter three begins by critically analysing the discourse surrounding the iN2015 Masterplan, particularly through its video entitled *Imagine Your World in 2015*, where Singapore is depicted in the year 2015 and thoroughly integrated with pervasive computing. In this chapter, I draw on Baudrillard's argument that the social construction and control of subjectivities function through the "political economy of the sign" resulting in the "political economy of the subject" ("For a Critique of the Political Economy of the Sign" 60-100). Through a system of floating signifiers, needs and desires are coded that then become productive forces in disciplining and motivating subjects into active neo-liberal technological subjects. These codes are constructed through language and, particularly for this chapter, the myths of origin, tradition, difference, inclusion and technological empowerment. Together with the digital logic of participation, abstraction, control and acceleration,

information technologies and telecommunications are rendered positively transformative, efficient, seamless and empowering for *all*, while the paradox of control and exclusion in digital participation made invisible.

Singapore's vision of pervasive computing is not unique to itself. Chapter four investigates the visions articulated by Mark Weiser, whom many consider the "father" of pervasive computing or ubiquitous computing. Here, I argue that the striking similarities between Weiser's scenario, painted in his seminal article of 1991 "The Computer for the 21st Century," and that of the iN2015 video, even though they are almost two decades apart, are far from a simple coincidence. It points to similar strategies of deploying visibility and invisibility in their discourses, which I argue are an effect of the techniques and technicity of the technology as well as its history. Weiser's discourse grounds itself on the politics of "everyday life" by connecting to "tradition" and the familiar, making ubiquitous computing seem positively transformative, seamless and empowering. In Weiser's establishment of normative relationships with ubiquitous computing by linking it to older forms of technologies, he simultaneously erases from view the crucial differences in techniques and technicity between new media and the old media he highlights. Hence, Weiser's seamless vision of ubiquitous computing achieved through the language of "tradition" and technological continuity, is paradoxically based on a discontinuity with the historical values and social contradictions linked to the technologies fundamental to ubiquitous computing, that is, networks, Virtual Reality and Artificial Intelligence. This "blindness" is an effect of the Cold War technologies and technicity underpinning ubiquitous computing, its speed and ubiquity.

Crucially, Weiser's ubiquitous computing prototypes and discourse then repeat military thoughts and strategies, particularly the total war strategy of "empowering" the peripheries, and the Cold War tactic of soft power based on attraction and disorientation. Simultaneously, as a result of the history of liberal trade with Enlightenment notions of progress that pervades networks, Weiser's neo-liberal utopian views of networks not only disguise the capitalist rationale of work and efficiency, but also the desire to perfect the world and humans under one language/code. Throughout Weiser's discourse, the mutually constitutive relationship between academia, industry and the military, as well as the reversibility of their technologies and technical knowledge are obscured. Bringing in Genevieve Bell and Paul Dourish's critique of Weiser, I also argue that despite Bell and Dourish's attempt to situate ubiquitous computing in the present, to take account of the "messiness" of the technology and everyday life, their rhetoric mirrors Weiser's productive move, albeit differently. By creating a series of false binaries between Weiser's seamless discourse based in the future and their discourse based on the current messiness of everyday life, as well as "Western" individualism and "Eastern" collectivism, Bell and Dourish's narrative is based on culturally essentialist views that are a product of their time and are themselves productive of future waves of research and development, grounded on the basis of "difference" or "alternative" views and use of ubiquitous computing. Written at a time of growing disenchantment with the "West" and academic focus on "alternative" views to "Western" thoughts, which in turn coincides with the economic rise of the "East," their discourse opens up new spaces of enquiry for what they observe as a stagnating "Western" research and development in ubiquitous computing.

This production of "difference" works by enforcing the rigidity of the pairings and obscuring the complex, mutually constitutive relationship among the categories. I argue that Bell and Dourish's desire for "difference" actually obeys the digital logic of abstraction (general equivalence), simulation and circulation demanded by information technologies and telecommunications and reflects the context of neo-liberal production of "difference" or social relations for consumption that has pervaded universities. In this instance, mainstream views of ubiquitous computing (embodied in Weiser's vision of a future ubiquitous computing environment in America) and "alternative" views of the same technology (exemplified by Bell and Dourish's account of present ubiquitous computing environment in Korea and Singapore) are equally productive and form two sides of the same academic-technological development coin.

Chapter five situates the mutually constitutive relationship between academia, industry and the military, as well as their reversible technologies and technical knowledge in the context of Singapore through the mutually constitutive relationship between the iN2015 Masterplan and 3G SAF. This chapter begins by closely analysing the discourse surrounding 3G SAF's transformation, which aims to harness the latest C^4ISTAR technologies to integrate and "empower" the various military services (army, navy and air force) into one network-centric and knowledge-based fighting force, equipped for network-centric warfare. Here, I demonstrate how the techniques and technicity of C^4ISTAR technologies, as well as neo-liberal values and rationality, structure military thoughts and actions. In particular, I highlight the highly optimistic discourses promoting C^4ISTAR technologies and valorising neo-liberal technological subjects needed by such technologies. While these discourses focus on the positive and ignore the negative side of the technologies, they simultaneously

monitor deviating thoughts and reservations about the technologies (within the military ranks) carefully.

Furthermore, I argue that the tremendous faith in the technologies, grounded on the rhetoric of machine "intelligence," speed, accuracy and control, provides the conditions of possibility for more machines to eventually remove humans (argued as the "weak" link) from the cybernetic loop. The desire to replace humans (and thus their will and responsibilities) with machines is grounded on "blindness" to the fact that these technologies, paradoxically, are based on inherently flawed codes. I argue that this blindness is caused as much by the digital logic of speed as by the reversal of capitalist rationale and neo-liberal values pervading military thought and strategy. In the case of Singapore, how the success of its defence industries influences the production of defence entrepreneurs who are also motivated, innovative risk-taking network warriors – network warriors who are the same active neo-liberal technological subjectivities produced by the iN2015 Masterplan.

In looking at the coinciding needs of 3G SAF and the iN2015 Masterplan, I point to the synchronicity of scientific and technological development equally useful for the industries promoted by the iN2015 Masterplan and 3G SAF. Since the subjects extolled and nurtured by both the Masterplan and the 3G SAF are fundamentally the same, these subjects intensify the "circulation of elites," put in place historically and politically. Moreover, under the rubric of "Total Defence," any further distinction between the iN2015 subjects and the network warriors are effectively dissolved. In fact, this chapter situates the iN2015 Masterplan as part of the larger militarisation of Singapore society where the "Total Defence," promoted by the government and tasked to every citizen, encompasses not just military and civil defence, but also psychological, social and economic defence. Here, defence or security, like

consumption, becomes a productive force in producing active subjects in support of its project.

Singapore, via the iN2015 Masterplan, is instructive of the shifting political landscape brought on by globalisation and its technologies. With the proliferation of information technologies and telecommunications, and their accompanying post- Cold War techniques and technicity, as well as neo-liberal values and rationality, traditional forms of power are increasingly being complemented by more insidious and total forms of control. Crucially, these forms of control work not so much through repression, as through persuasion, disorientation and induction into the governing codes. These codes are perpetuated via material and immaterial means, in the case of Singapore, through discourse (including myths, narratives and rhetoric), education, "friendly" policies, and the building of the necessary infrastructures and technologised spaces. As a result, active technological subjects are produced, in the consumption of these codes, to sustain the complex globalised and militarised structure.

The role of information technologies and telecommunications is pivotal to this process of persuasion, disorientation and induction, and in fact intensifies their efficacy. Here, the transparency of discourse is complemented by the capability of the technologies to invisibly code needs and desires, just as the pervasiveness of political, economic, and military control is supplemented by the ubiquity of the technologies. What results is a proliferation of consumption of information technologies and telecommunications mistaken as "progress" and acts of "empowerment," when such consumption in fact strengthens the very structure that is creating a corresponding loss of civilian space, putting radical singular thought and responsibilities under threat. By drawing out the various intricate connections between the iN2015 Masterplan, its

technologies, and their histories, I hope to map a picture of this globalised and militarised structure, its expansion and intensification. This is crucial precisely because these globalised and militarised networks, not only create repercussions beyond the shores of Singapore, but fundamentally impact on what it means to be human.

Chapter Two:

From the *Smart Apron* to the Cyborgs: Re-assessing the Claims of Personal Empowerment in Wearable Computing

> "The most fundamental paradigm shift that wearable computing has to offer is that of personal empowerment" (Steve Mann, "Wearable Computing as Means for Personal Empowerment" 4).

> "If all is movement all is at the same time accident and our existence as metabolic vehicle can be summed up as a series of collisions, of traumatisms… but above all *a different mode of being*" (Paul Virilio, *The Aesthetics of Disappearance* 103).

2.1 The *Smart Apron*, the Cyborgs, and Personal Empowerment: An Introduction to their Interconnections

In 2003, I wrote an art proposal for a "smart" apron that sought not only to redress the social and cultural perceptions governing domestic work, but also to reflect upon the working conditions of foreign domestic workers in Singapore.[8] In the proposal, I quoted Steve Mann and his point about wearable computing and personal empowerment, and argued that there is no one more deserving of personal

[8] At that time, I was involved with a non-governmental group called The Working Committee 2 (later renamed Transient Workers Count Too), an ad hoc gathering of individuals from different strata of Singaporean society (including foreign domestic workers), concerned with the growing abuse and poor working conditions some migrant workers face working in Singapore. See Transient Workers Count Too <http://www.twc2.org.sg>. However, before this project, I was already working on issues of housework and domesticity, from a feminist standpoint, using my art as symbolic devices for discussing female subjectivities in the larger patriarchal culture. See <http://web.mac.com/margetan>.

empowerment than foreign domestic workers. That proposal won me an "Honorable Mention" in the 2003 "Digital Pluralism" UNESCO Digital Arts Award, and subsequently in 2004, a five-month residency to realise the project at the Swiss Centre for Electronics and Microtechnology (a Swiss commercial laboratory specialised in making microelectronic devices and systems), under the auspices of the "Artist-in-Labs: Processes of Inquiry" residency programme. In 2005, as part of my application proposal to pursue research for this PhD at Communications and New Media Department, National University of Singapore, I proposed developing a wearable computing prototype that takes into account the experiences and life-contexts of its users in its development, particularly the "Asian" context of Singapore. Here again, I quoted Mann on his point about wearable computing as personal empowerment.[9]

Using my wearable artwork the *Smart Apron* as a technological probe, this chapter is an attempt to go back and re-read Mann and the rhetoric of empowerment in wearable computing, a subset of Human-Computer Interaction in the larger pervasive computing research – areas targeted by the iN2015 Masterplan for research and development. Wearable Human-Computer Interaction can be broken up into two main groups. The first, "computing under the skin" are wearable computers implanted under the skin to regulate physiological parameters and/or act as cognitive and sensory prostheses. They range from microchip implants to medical devices such as

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[9] See "Digital Pluralism," UNESCO 2003 Digital Arts Award <http://www.iamas.ac.jp/unesco_award/e/index.html>, CSEM: Swiss Centre for Electronics and Microtechnology <www.csem.ch/>, AIL: "Artist-in-Labs: Processes of Inquiry" < http://artistsinlabs.ch/>, and Communications and New Media Department, National University of Singapore, see <http://www.fas.nus.edu.sg/cnm/>.

cochlear implants and are meant to extend human's sensory motor and information processing abilities. The second, "wearable computing" are self-powered and self-contained computers that can be worn on the body, in the form of clothing or accessories. They aim for hands-free operations and to provide users access to and interaction with information "anywhere and at anytime" (Barfield and Caudell 4-7). By the fact that wearable computing is "always on" and with the wearer, it is also regarded as "well placed" to "invisibly augment" human intelligence, aid communication and collaboration, and boost productivity (Billinghurst and Starner 57-64).

Starting with the *Smart Apron* allows me to both situate and complicate my feminist art politics and the development of this dissertation in the context of technocratic and post-colonial Singapore, as well as highlight the double-edged and reversible nature of empowerment that I have come to realise in the making of, and now writing about, this artwork. To show the double-edged and reversible nature of empowerment, I compare and contrast the discourses of Steve Mann and Donna Haraway. I single out Steve Mann because as the "first cyborg" (Lotringer and Virilio 79), he is considered a pioneer and influential figure in the research and development of wearable computing both as an academic and as an engineer/artist. Moreover, as highlighted above, Mann's claim that personal empowerment is fundamental to wearable computing had a direct impact on my *Smart Apron*, through which I sought to "empower" and represent the working conditions of certain foreign domestic workers in Singapore. I draw on the discourse of Haraway because I was also inspired by her call for "subversive" uses of cybernetic technologies that is, simultaneously, responsible, accountable and aware of its complicit relationship with technology in

the context of the "homework economy" and "integrated circuit" ("A Cyborg Manifesto" 304, 307).

In comparing and contrasting Mann's masculinist "photoborg" ("I am a Camera" n.p.) with Haraway's feminist cyborg, I show that while Mann is single-minded in his quest for individual freedom and consumer market alignment as a "counter" to the military whilst Haraway is very conscious of social justice, of her complicit relationship with the military-industrial-complex and, hence, the double-edged nature of empowerment. Nevertheless, I argue that despite Haraway's conscious and socialist-feminist politics, her celebrated mobile cyborgian subject lends itself easily for misinterpretation and misappropriation, especially in today's context of intensified convergence of military research with industrial, academic, political and artistic experimentations that, more often than not, leave the structure of technological consumption intact. Since the *Smart Apron*, an artwork about Singapore, is realised in Switzerland under an art residency programme developed and hosted by a Swiss university that puts international artists in Swiss laboratories, it clearly embodies this complicity, mobility and convergence.[10] The *Smart Apron* points to how such art-science residencies that have proliferated in this context of convergence, aimed at producing the art-science hybrid subjects that they need eventually to feed back into the knowledge-based technological economy.

The chapter is broken up into two main sections. The first section starts by situating the *Smart Apron* vis-à-vis the rhetoric of Steve Mann and highlights how his claim of wearable computing as personal empowerment is based on a non-reflexive

[10] The Swiss programme and university mentioned here is the Institute of Cultural Studies in Art, Media and Design, School of Art and Design Zurich, University of Applied Sciences and Arts Zurich, Switzerland. See <http://www.zhdk.ch/index.php?id=717>.

neo-liberalism. For example, Mann's demand for personal rights (to be left alone) and his distrust of state power recapitulates neo-liberal discourses that pitch individual freedoms against state power, while disguising the fact that neo-liberalism and the state are mutually constitutive in consumer-driven societies. At the same time, I argue that Mann's innovations "blind" him to the ways his Wearables shape his subjectivity, the way he narrates himself and his solutions for what he perceives as an Orwellian world of ubiquitous surveillance – solutions that, paradoxically, subject users to more surveillance and control by cybernetic technologies. This section also brings in the arguments of Paul Virilio to show how these technologies are not neutral but fundamentally change the mode of being. Through miniaturisation, speed of information processing, and ubiquity or what Virilio terms "the aesthetics of disappearance," such technologies produce a series of "blindings," which result in the human loss of "concrete presence" in the world and the dissimulation of the Other (*Open Sky* 10). In other words, these technologies are structuring human thoughts, making users "blind" to how the empowerment of one is often accompanied by the relative disempowerment of another, as Mann's narrative demonstrates.

The last section of this chapter situates the *Smart Apron* vis-à-vis the socialist-feminist discourse of Donna Haraway, particularly her points on the possibility, complicity and responsibility of the international women's movement in the integrated circuit and homework economy. This section highlights that, unlike Mann, Haraway is fully conscious of the violence of miniaturisation, its potential for dematerialising humans and politics; in short, the double-edged nature of empowerment. However, using the arguments presented by Maurizio Lazzarato in "Immaterial Labor," and through the challenges faced by me in the development of the *Smart Apron*, I highlight how Haraway's call for socialist-feminist networking in

the integrated circuit and the subversive use of cybernetic technologies gets misinterpreted and misappropriated. In the face of the current knowledge production economy that depends on active subjects of communication, abetted by technologies that operate on the aesthetics of disappearance, the dual nature of empowerment becomes invisible just as Haraway's call for responsibility, apart from pleasure, in the integrated circuit gets forgotten.

2.2 Wearable Computing and the Logic of Disappearance: the Duality of Empowerment

To fill the gaps left by women in Singapore leaving their homes for the labour market, the city-state has seen a steady climb in the employment of foreign domestic workers (20,000 in the early 1980s to 190,000 today) to fill the roles vacated in the homes. As these foreign domestic workers come mainly from "poorer" countries like the Philippines, Indonesia and the Indian sub-continent, social, cultural and language differences often pose huge challenges for both employers and employees to understand each other, and especially for the latter to integrate into Singapore's ways of life. Yet, the strong Singapore currency and the lack of work opportunities in the foreign domestic workers' home countries continue to compel these women to seek work here. On the Singapore side, the creation of double-income families, the lack of adequate and cheap childcare and eldercare systems and the aversion of government bodies and companies to flexi-work hours, continue to fan this increasing reliance on foreign domestic workers. One social consequence of this situation are persistent cases of abuse of foreign domestic workers, ranging from subtle forms of exploitation such as sleep and food deprivation, the absence of rest days (exacerbated by the lack

of legal protection, in particular for the Indonesians), to extreme physical abuse resulting in prolonged torture and even death (Gee and Ho 22-46).[11]

The *Smart Apron* is my feminist artwork that sought to address this issue of foreign domestic workers in Singapore and the problems they face. The *Smart Apron*, through its technologically "enhanced" design, aimed to present housework as professional work and to remind people to accord the persons doing such work respect and dignity. Through particular technological features embedded in two sets of aprons, it also wanted to highlight specific problems faced by some of these workers such as their risk of falling from high-rise apartments, their isolation and lack of social networks or recourse for help in situations of need (I will address these later). I was at the time convinced by Mann's claim that personal empowerment is fundamental to wearable computing, and wanted the foreign domestic workers to "have" this empowerment through the *Smart Apron*.

Steve Mann is a pioneering and prolific researcher in wearable computing, who has over 200 research publications, books, and patent publications. He has been the keynote speaker at more than 25 scholarly and industry symposia and conferences, and invited speaker at more than 50 university Distinguished Lecture Series and colloquia. Mann is currently a tenured professor at the University of Toronto, Faculty of Applied Science and Engineering as well as the Faculty of Arts and Sciences, after obtaining his PhD degree from the Massachusetts Institute of Technology (MIT) in

[11] In 2009, the official number of deaths from accidents or by suicide has come down from forty in 2004 to nine. Meanwhile, the number of complaints of salary arrears has dropped from three hundred and forty-seven in 2005 to two hundred and nineteen, while the substantiated cases of maid abuse has declined from one hundred and fifty-seven in 1997 to fifty-three (T. Tan "Life Looking Better for Foreign Maids"). Although the number of deaths and abuse cases of foreign domestic workers have declined through the years, subtle forms of exploitation, however, remain hard to detect and prosecute. Furthermore, the absence of rest days persists as the Ministry of Manpower reiterates its position not to legislate compulsory rest days for foreign domestic workers.

1997. Apart from being an established and influential researcher, Mann is also an accomplished artist. He has consistently applied his engineering and computational skills to an art practice beginning in the 1970s that continues to this day, winning numerous awards along the way. Together with two of his students, Mann has also set up a Canadian company to commercialise the "cyborg technology" developed by him and his students (Mann, "One Page Biography" n.p.).

In 1998, during his keynote speech "Wearable Computing as Means for Personal Empowerment" for The First International Conference on Wearable Computing, Mann defined and differentiated wearable computing from other handheld devices like laptops and personal digital assistants (PDAs). He argued that as wearable computers are "always ready" ("always on"), they afford wearers total encapsulation, "augmentation" of the intellect and senses, thus allowing users solitude, privacy and safety ("Wearable Computing" n.p.). Furthermore, according to Mann, because wearable computing is tether-less, it provides users mobility and freedom to do other activities, without the need to focus attention primarily on computing. Hence, he claimed, the technology is attentive to not only the users and their environments, but also responsive to their needs. At the same time, however, Mann maintained that wearers remain "in control" of the technology because they can manually override or "break open the control loop and become part of the loop at any time" ("Wearable Computing" n.p.). Finally, Mann pointed to the communicative aspect of the technology, as a tool for direct communication and collaboration, as well as an expressive medium for artistic production.

Mann drew on the history of military inventions and situated wearable computing within this context to stress the point of wearable computing as personal empowerment. He argued that early civilisations were fundamentally equal but with

every military tool invented – first the stirrup, then gunpowder and later guns – this balance is breached only to return when individuals had access to these inventions of their time. He contended that wars today are fought with information, and cameras and computers have become the new instruments of social control. Mann highlighted this system of social control as characterised by "total surveillance" and "micro-management," from mass media, advertising, to elevator music, intruding on peace and solitude, and resulting in the unhealthy "homogenization of society" and a "certain loss of human dignity" ("Wearable Computing" n.p.). However, Mann maintained that as with the stirrup and gunpowder, the advent of low-cost consumer electronics is levelling the playing field of electronic surveillance. He pointed to how the Internet is ushering in new and "alternative" contents and how the increasing numbers of personal computer ownership provided a counter to major media conglomerates and central control, both of which are "threats to human individuality and freedom" ("Wearable Computing" n.p.). With ubiquity and speed, in terms of the adoption rate of the technology by the masses, Mann argued, "the military is losing its edge" since "consumer technology has already brought about a certain degree of personal empowerment" ("Wearable Computing" n.p.). He claimed, wearable computing will level the playing field "should the major consumer electronics manufacturers beat the military to raising this invention to a level of perfection similar to that of the stirrup or modern handguns" ("Wearable Computing" n.p.). Mann concluded that wearable computing functions "as a true extension of the mind and body" with the "capability to enhance the quality of life for many people" ("Wearable Computing" n.p.).

As I have highlighted before, inspired by Mann's point on personal empowerment and wanting to add a situated feminist perspective, I wrote the art proposal for the *Smart Apron*, laying out its main technological features. These included a language-translation mechanism (especially between Bahasa Indonesia and English), a physiological monitoring device (heart-rate, blood pressure, sleep, movement, et cetera), and a free peer-to-peer communication unit. However, I have come to realise that Mann's vision of wearable computing is influential but potentially stratifying, in terms of how the technology of wearable computing is understood and received. In "Introduction: Technological Visions and the Rhetoric of the New," Marita Sturken and Douglas Thomas point out that the history of technological development is often accompanied by a parallel history of visions about the technology (1-18). In the forms of rhetoric and/or metaphors, these visions encapsulate the fears, desires and hopes of how technology can have profound influences on human subjectivity and society. While the rhetoric surrounding technology tends to focus on how technology can alleviate needs or the sense of lack, metaphors flesh out compelling representations of some of these thoughts, sometimes at the risk of other possible ways of envisioning technological meanings. The authors argue, these "visions impact how technologies are marketed, used, made sense of and integrated into people's lives" (3). In this sense, Mann's rhetoric certainly influenced the way I thought of wearable computing, but it is time now for me to re-assess his narrative in terms of how they are themselves shaped by his larger social-cultural context, as well as by the logic of his technological innovations.

First, let me begin by looking at the person making the claims of empowerment. As indicated in his biography and highlighted earlier, Mann has benefited from the technologies he developed. These developments would be

impossible if Mann has not had access to certain resources. My point here is not to negate Mann's competence and hard work, but to point out the larger socio-cultural context where some technological development gets more conducive environments than others do, as my own example shows. In *The New Production of Knowledge*, Gibbons, et al. point to a new mode of knowledge production which is created in "broader, transdisciplinary social and economic contexts" (1). In this broad scope, social science and humanities are equally harnessed to solve problems of a particular application, as opposed to a particular discipline, but the question remains how these "problems of a particular application" are identified based on funding influences. Despite Mann's rhetoric of pitching the consumer market against the military, the research and development of wearable computing is as much (if not more) supported by the military as by industry. In fact, by creating a dichotomous relationship between consumer markets and the military, even as he situates wearable computing amongst the history of military inventions, Mann obfuscates the current intensified convergence of military and industrial interests in wearable computing, and certainly their capacity to shape research and development in academia.[12]

Robbins and Webster, in *Time of the Technoculture*, remind us that the current push and embrace of information technologies and telecommunications, render invisible the military roots of these technologies and hence the logic of control and domination that is embedded in these new technologies. They argue that the continued

[12] In 1992, for example, the Defense Advanced Research Projects Agency (DARPA) in America established the Head-Mounted Display (HMD) programme to seek out ways of providing soldiers on the battlefield hands-free, immersive and communicative operations. Some of their creations include the *Land Warrior* and the *Force XXI Soldier*. Adapting commercial off-the-shelf (COT) equipments and modifying them for military use is standard practice here although they come with both benefits and challenges. The biggest challenges of this practice are cross platform compatibility and the need to support multiple protocols. These problems have in turn prompted the emphasis on network-centric applications taught at the undergraduate levels of many universities (Tappert et al. 625-647).

use of information technologies and telecommunications in Information Warfare should not be regarded as some kind of misapplication, rather it should be understood as an example of how these technologies exert their controlling power over humans. Furthermore, the close link between the military (as the main funding body) and the industry, have resulted in science and technology research being harnessed "as a productive and innovative force to the pursuance of war (and the maintenance of a credible defence)" (Robbins and Webster 154). In today's context, Nick Turse, in *The Complex*, demonstrates how this complex web of relationships between the military, industry and academia has intensified. Giving many examples, he points out how, particularly for heavily consumer-driven societies, military technologies and technicity are nearly everywhere and pervade almost everything. From technological products to children's toys, movies to catering services, the military footprint can be found visibly and invisibly as military and civilian lives become highly entangled. The ability of the military to co-opt civilian cultures (for example, the "culture of cool") and penetrate academia has allowed it to shape public opinions as much as research agendas. "The Complex," according to Turse, hence points to the military-industrial-technological-entertainment-academic-scientific-media-intelligence-homeland security-surveillance-national security-corporate complex (16).

Mann's focus on consumer technologies as a source of empowerment also repeats the productive neo-liberal strategy of channelling the desires for freedom into acts of consumption. As highlighted in the previous chapter, neo-liberal rhetoric has effectively exploited (and continues to capitalise on) desires for liberation by translating them into a very particular kind of freedom, that is, a market-based populist culture of choice, differentiated consumerism, lifestyles and individual libertarianism (Harvey 41-42). This focus on consumer technologies as a source of

empowerment is certainly beneficial for Mann's innovations, since his claim that wearable computing will "bring about a much greater paradigm shift" ends in an appeal for consumer electronic manufacturers to raise the development of the technology to "perfection." Mann's neo-liberal slant extends to his desires for solitude and privacy based fundamentally on the neo-liberal conception of subjects as entrepreneurial individuals with strong private property rights, linked to free market and free trade (Harvey 2). Further linked to Mann's neo-liberal notion of the entrepreneurial subject with strong privacy rights is his distrust of state power. Mann's narrative of pitching individual freedoms against state power, consequently, disguises the fact that neo-liberalism and the state are mutually constitutive in consumer-driven societies.

The role of the state in neo-liberal discourse is supposedly limited to creating and preserving an institutional framework that is appropriate to the freedom of the market and of trade. This framework includes the setting up of monetary, legal, and military structures, functions and environment conducive for secure and stable trade. If markets do not exist, then they are to be created. Once these conditions are met, state intervention into the market is to be kept to a minimum (Harvey 2). In practice however the state plays an active role, as it does in the case of Singapore, in sustaining the notion of free enterprise. This is achieved sometimes by force, violence and authoritarianism, but more often than not, through the rhetoric of freedom and empowerment as means of constructing consent because they resonate widely (37-39). It is precisely through the latter means that neo-liberal logic pervaded (and still pervades) corporations, media, think tanks, civil societies and universities through a programmatic advance of the cause of individual freedoms, while paradoxically disguising the drive to restore economic class power (40). Hence, in neo-liberal

discourse, such as Mann's rhetoric, all state powers continue to be constructed as oppositional to corporations (defined as individuals), entrepreneurial freedom and individual liberties, even though this is not necessarily the case.

Besides neo-liberalism shaping his mode of being, the way Mann narrates himself and his innovations are equally structured by C^4ISTAR technologies and technicity. A majority of Mann's inventions are reactions to what he perceives as an Orwellian world of ubiquitous surveillance. His response to the encroachment of his privacy by a society under constant surveillance by the state is twofold. His first strategy is to turn his body into what he terms a "photoborg" ("I am Camera" n.p.). Using the "photoborg" then to "shoot" establishments, government and their automated machines, Mann argued that this was his way of turning the tables on them ("Privacy Issues" n.p.). His second strategy was, through wearable computing, to create a digital space for "personal solitude" and extend the privacy of the home "out into the world" ("I am Camera" n.p.; "Wearable Computing" n.p.).

In line with this rationale of counter-surveillance, Mann distinguished surveillance into different categories, depending on who is performing the surveillance.[13] To him, surveillance is "*desirable*" when aimed at "Big Brother" and "Big Business" ("Privacy Issues" n.p.). Here, Mann contradicts himself since the government/military and corporations are what he needs in order for his innovations to reach the consumer markets. To counter the "machine vision [that] has become a little too pervasive," Mann recommended access to surveillance technology as a way of obtaining power by individuals – an access made easy by miniaturisation and its resulting ubiquity. He argued that "miniaturization has turned the technology into an

[13] For Mann, government and establishments looking at people is unacceptable/unfair, establishments looking at establishments or people looking at people are neutral, while people looking at establishments and government is acceptable/fair ("Privacy Issues" n.p.).

equalizer rather than an oppressor" ("Privacy Issues" 6). As a result, Mann recommended "sousveillance," an inverse form of surveillance by the masses, as a way to balance what he regards as an era of increasingly one-sided surveillance ("Sousveillance" n.p.).

Mann's rationale of "sousveillance" has generated its fair share of criticism, namely, that by strapping more cameras to the bodies of ordinary citizens, he is creating a vigilante society (Strauss "Little Brother is Watching You!"). Moreover, his notion of surveillance is trapped in a simplistic "us and them" dialectic, while his views on privacy are based on culturally specific Enlightenment concepts of distinct public/private spaces and the "cult of the individual" (Lane qtd. in Leech "Lost in Cyborgspace"). What I want to stress here is how the irony of "sousveillance" is adding to, rather than removing, the problem of ubiquity, suggesting an enframed mind that repeats the logic of its technology. Mann's solutions for escaping the ubiquity of surveillance are, paradoxically, to distribute more cameras into an already saturated environment and to enclose himself (and others) with miniaturised systems that constantly "sense" or monitor users invisibly. By pitching miniaturisation as a way out of "machine vision," Mann clouds the fact that miniaturisation is what allows for its speed, automation and ubiquity, eventually leading to "the vision machine," the very technology Mann is supposedly opposing and yet constructing.

According to Paul Virilio, vision machines are technologies capable of automated perception, replacing humans from the realm of direct observation. In these sightless visions, machines generate synthetic images for machines, removing human intentionality and control. What results is also an inversion of perception, where pervasive objects observe humans rather than the other way around (*The Vision Machine* 59-62). Hence, Mann's Wearables, instead of affording wearers control,

paradoxically removes the users' intentions and subjects them under the control of the machine's logic. Virilio further points out that vision machines are "absolute-speed" machines that undermine "traditional notions of geometric optics" (72); instead, they function on intensive time (speed of light), where speed is less about getting around easily than about seeing and conceiving more or less clearly (71). The production of sightless vision, Virilio argues, is therefore a reproduction of intense (human) "blindness" (73). Hence, through miniaturisation and speed (mediation of time in picoseconds), humans become "blind" to the mediation of their existence under C^4ISTAR techniques and technicity; in short, to the violence of speed and its accidents.

Therefore, unlike Mann's account that regards such wearable computing as ultimately separate and neutral, Virilio argues that miniaturisation, by reducing to next to nothing the size of machines and incorporating them pervasively into human environment and within the human body, is creating para-sensory competition for subjectivity and affecting the very mode of being (*The Aesthetics of Disappearance* 67). The aggression in Mann's zero-sum strategies of shooting, surveillance and counter-surveillance, as well as his military analogies, are clear examples of this repetition of C^4ISTAR techniques and technicity or what Virilio calls the "military architecture" (*Virilio Live* 51). The military architecture comprises the architecture of ballistics, where gazes, masks, screens and other means of deflecting shots, as well as acts of destruction, are part of its construction (Ibid.). Thus, Mann's notions of constancy, mediation and augmentation in wearable computing, are all operational modes based on policing effects that are very much a part of this logistics of perception in the military architecture (*Virilio Live* 187), which is masked and deflected by his rhetoric of empowerment, freedom and control. Under the logistics of

military perception, Virilio continues, there is a deadly harmony between the functions of the eye and weapon (*War and Cinema* 69), which at the same time operates on and effects the "aesthetics of disappearance" (*Virilio Live* 124). The aesthetics of disappearance "blinds" humans to the fact that research and development, such as those of Mann's, play a leading role in the constitution and perpetuation of the military architecture (*The Vision Machine* 70). In this case, Mann's contention that increasing personal computer ownership creates "alternatives" to mass media conglomerates and the state ignores how such decentralised consumption and creation are easily re-appropriated by these core systems.[14] Crucially, Mann's positioning of wearable computing as the ultimate "paradigm shift" to counter total surveillance and micro-management, grounds itself on the disavowal of the technology's military logic and neo-liberal values that then "blinds" users to how wearable computing repeats and, in fact, intensifies total surveillance and micro-management.

The aesthetics of disappearance, therefore, produces "blindness" at several levels. It "blinds" humans to the mediation of their existence under cybernetic techniques and technicity that, simultaneously, is a consequence and perpetuation of the violence of speed (Virilio, *The Aesthetics of Disappearance* 103-104). Under the aesthetics of disappearance, the disappearance of technology (through miniaturisation) is directly linked to the disappearance of the violence of speed (grounded in the mediation of time in picoseconds) and the resulting double disappearance of matter and places (Virilio, *Speed and Politics* 134). Virilio highlights that as bodily perceptual faculties are being transferred increasingly to machines, there results a "killing" of present time by isolating it from its here and

[14] I address this point of the decentralisation of control for the tactical consolidation of the centre in chapters four and five.

now in favour of a commutation elsewhere, which in turn removes humans from the "concrete presence" of the world (*Open Sky* 10). This then facilitates the dissimulation of people and bodies (Virilio and Lotringer 102).

Mann's other strategy to turn wearable computing towards "personal solitude" further accentuates the dissimulation of the Other. His notion of the "photoborg," a combination of photographer-cyborg, is reminiscent of the Modern Man's obsession with vision, a particular "gaze of domination over the exterior world" (Colomina 112). What Mann proposed – a body as a photographic machine – is not far removed from what Le Corbusier proposed for his architecture – a house as a photographic machine. Mann accesses the world through the camera lens, just as Le Corbusier looked through the window, framing and thereby taming the "overpowering" outside/landscape, in a process of domestification (56). Furthermore, his idea of "sous" (below) rather than "sur" (top) –veillance, harks back to the modern *flaneur*, or the avant-garde Situationist drifting mindlessly in the city for chance encounters. These subjectivities are based on an elite, masculine subject, privileged in his mobility, with a distaste for domesticity yet at the same time intent on turning public spaces into his private playground (McLeod 1-37). At this point, I turn to the feminist discourse of Haraway to discuss the double-edged nature of empowerment in terms of the complicated and complicit relationships with the military and technological economy, abetted by immaterial labour under the neo-liberal logic of communication.

2.3 Complicating the *Smart Apron* and Situating the Cyborgs: The Role of Immaterial Labour under the Neo-liberal Logic of Communication

In “A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century”, Donna Haraway uses the figure of the cyborg as a metaphor to describe the kinds of subjectivities, both fictional and real, which are constituted by today’s information society (291-324). Haraway’s feminist cyborg, in contrast to Mann’s masculinist “photoborg,” raises the issues of possibility, complicity and responsibility of the international women’s movement within “the integrated circuit” (Harraway “A Cyborg Manifesto” 307). Meant as an ironic, self-conscious reflection on women’s engagement with technology, Haraway’s cyborg points to the complicities and possibilities of its own ontology. She highlights “the main trouble with cyborgs, of course, is that they are the illegitimate offspring of militarism and patriarchal capitalism, not to mention state socialism. But illegitimate offspring are often exceedingly unfaithful to their origins. Their fathers, after all, are inessential” (293). The “Cyborg Manifesto,” she contends, is “an argument for *pleasure* in the confusion of boundaries and for *responsibility* in their construction” (292). Since the cyborg world is about both the “final imposition of a grid of control on the planet, about the final abstraction” and the potentials when “people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints,” Haraway argues that the political challenge is to see from both perspectives at once (295).

Unlike Mann, therefore, Haraway is well aware of the dangers of modern machines that are everywhere and invisible. She highlights how miniaturisation and microelectronics have changed human’s experience of mechanisms. She argues that “miniaturization has turned out to be about power; small is not so much beautiful as

pre-eminently dangerous, as in cruise missiles" ("A Cyborg Manifesto" 294). She points to the evolution of television in the 1950s to the current portable hand-held video cameras and argues that the "best machines are made of sunshine; they are all light and clean because they are nothing but signals, electromagnetic waves, a section of the spectrum, and … eminently portable, mobile – a matter of immense pain in Detroit and Singapore" ("A Cyborg Manifesto" 294). In other words, Haraway reminds us of the microelectronic workers and their working conditions that are fundamental to our light and "clean" technologies, which remain "invisible" or dematerialised by the effects of these machines. Haraway maintains that the "ubiquity and invisibility of cyborgs is precisely why these sunshine-belt machines are so deadly. They are as hard to see politically as materially" ("A Cyborg Manifesto" 294). Consequently, she distinguishes different cyborgian subjectivities. Haraway points out that "[w]ho cyborgs will be is a radical question. The answers are a matter of survival" and the subversive potential of the cyborg and its seeming "ability" to transgress race, class and gender boundaries are not without ironic implications or signs of privilege, "which progressive people might explore as one part of needed political work" ("A Cyborg Manifesto" 294-295). For Haraway, therefore, in this complex information hierarchy of the integrated circuit, even as one is compelled to be a cyborg in order to survive, the empowerment of one is really linked to the survival of another.

In this spirit, the *Smart Apron* wants to raise issues of ethics and responsibility in this integrated circuit by highlighting the working conditions of certain foreign domestic workers in Singapore in the context of the homework economy. The homework economy, according to Haraway, is an effect of the global economy where the extreme mobility of capital merges with the international division of labour, made

possible by information technologies and telecommunications, to weaken familiar groupings (“A Cyborg Manifesto” 304). Although Haraway points to these systematic developments as “neither gender- nor race-neutral,” the homework economy is really about issues of production, reproduction, sexuality, consumption and culture that affect both men and women (“A Cyborg Manifesto” 304). For Haraway, a key concern of the homework economy is the formation of “a strongly bimodal social structure … controlled by high-tech repressive apparatuses ranging from entertainment to surveillance and disappearance” (“A Cyborg Manifesto” 307). Therefore, while information technologies and telecommunications provide new opportunities for the scientific and technological class, these same machines (through automation) are putting more and more people in the lower strata of societies out of work and without replacement, necessitating their movement (as in the case of foreign domestic workers) to seek jobs outside their home countries.

At the same time, Haraway reveals how the homework economy is also a coming together of nationalism, imperialism and multi-nationalism and their corresponding aesthetic period of realism, modernism and postmodernism. In this convergence, facilitated by information technologies and telecommunications, public life is eradicated and the home, factory and market are being integrated at an unprecedented scale, affecting different women differently (“A Cyborg Manifesto” 305). This is contrary to Mann’s insistence of the home as the last bastion of space untouched by surveillance. Mann’s maintenance of the clear distinction between public and private space and his denial of the role of personal computers blurring the two spheres, allows him to then pitch wearable computing as securing this “personal space,” even as the same technology ironically invades every space with its surveillance technologies, through its mobility.

By contrast, the dual nature of technologies is clear for Haraway as she points out that the technologies that promise ultimate mobility and perfect exchange are the same technologies that facilitate tourism, the militarisation of society and biotechnology. Hence, Haraway argues, who controls these technologies is a major feminist issue ("A Cyborg Manifesto" 306). However, well aware of the "deeply predatory nature of photographic consciousness" produced by these machines, she maintains, "self-help is not enough" ("A Cyborg Manifesto" 306). Instead, Haraway calls for networking, an appropriation of corporate strategy, among women in the integrated circuit to develop a socialist-feminist science/technology politics that is at the same time subversive of the military and capital ("A Cyborg Manifesto" 307-309). This can be done, according to Haraway, through a contest for meanings. She claims "[c]yborg writing is about the power to survive, not on the basis of original innocence, but on the basis of seizing the tools to mark the world that marked them as other … Feminist cyborg stories have the task of recording communication and intelligence to subvert command and control" ("A Cyborg Manifesto" 311).

Although I agree with Haraway on many of her observations and points raised, I am becoming unsure about the effectiveness of her calls to appropriate and subvert cybernetic technologies. In the face of the current knowledge production economy, which is also adapt at translating desires for liberation into a very particular type of freedom achieved only through technological consumption, such a strategy is not as straightforward as it seems. Let me demonstrate this by first highlighting the tensions of my feminist "liberation" project embodied in the development of the *Smart Apron*. In my initial proposal for the *Smart Apron*, I had proposed features that included a language-translation mechanism, a physiological monitoring device (heart-rate, blood pressure, sleep, movement, et cetera), and a free peer-to-peer communication unit. My

rationale for the language-translation mechanism was to facilitate the communication between the foreign domestic workers and their employers, while the free peer-to-peer communication unit was for networking opportunities among the workers themselves. As for the physiological monitoring device, it was to allow the apron to tabulate the total energy expenditure and time of physical activity in order to make the "invisibility" of housework visible. More importantly, the physiological monitoring device was also meant to monitor the stress level of the foreign domestic worker and her general physical well being and alert authorities of abuse. However, since I am working with technologies embedded with C^4ISTAR techniques and technicity, the disempowering potential of surveillance for the foreign domestic workers gave me second thoughts about the physiological monitoring device. Before dropping this feature from the *Smart Apron*, however, I contemplated the possibility of "rigging" it to reflect the zero-work strategy espoused by the Italian Marxists to challenge the capitalist and socialist system of waged-slavery (Negri). Of course, this would mean a corresponding disempowerment of employers, many who do treat their employees well and fairly. Eventually, the idea of the physiological monitoring device was dropped from the *Smart Apron* altogether.

As an artistic project, the *Smart Apron*'s final technical design is also a complex mix of technologies shaped by what was available (or not) to me, dictated as much by the market as by the conditions of my residency in Switzerland. The idea of getting technology to translate Bahasa Indonesia to English was an almost impossible task to begin with for, despite existing research and development in this area, the complexity of electronic translation itself is nowhere near the sophistication of actual languages. Furthermore, such technologies displace efforts for face-to-face communication or what are really needed for the relationship between the foreign

domestic workers and their employers. Apart from the issues regarding available technologies, putting artists into science laboratories also poses its own set of challenges. Such "collaborations" are often dependent on the individual personalities and skills of the collaborators, their ability to work together, the time and resources available to them, patent issues, and so on.[15] As a result, I eventually created two pairs of aprons with different technological features through different circumstances, one with the help of the laboratory, the other with the help of an independent programmer.

The first set of aprons, made using existing research from the Swiss Centre for Electronics and Microtechnology, incorporate a fall detector (symbolic of the fall of foreign domestic workers from high-rise buildings – a prominent architectural form in Singapore). The fall detector consists of an accelerometer attached above the waist and a main unit in the lower pocket of the apron (see fig. 1 and 2). It can detect an actual fall by calculating the force of impact of the body against the time it stays in the reclined position (see fig. 3). A signal is then sent out of the detector for help in an actual fall, which currently is indicated through light-emitting diodes or LEDs (green light for actual falls and red light for false alarms) mounted within the main unit of the fall detector. I had intended to send this signal out of the detector to my laptop for use in my performances but this part of the work remains incomplete. With the help of an independent programmer, I made a second set of aprons using a range of commercial off-the-shelf sensors. Each apron consists of a heat sensor (symbolic of the abuse faced by certain foreign domestic workers), a tilt/mercury sensor that sounds a buzzer when the user is bent-over forward for more than the pre-set amount of time (symbolic of the back-breaking household tasks), a panic button that sends an SMS message for help when activated, and a cord that when pulled, lights up three

[15] These are some of the issues I encountered making the *Smart Apron* in the Swiss laboratory (M. Tan 122-125).

LEDs while sending an SMS message “call me” to the other apron (see fig. 4 and 5). All sensors are attached to a (second-hand) mobile phone that sends these SMS messages from the apron to my laptop when the sensors are triggered. I had planned to complete this work with a performance based on sound files (of dialogues with some foreign domestic workers) triggered by the signals from the apron. Again, this part of the work remains incomplete.

The *Smart Apron* remains incomplete because I have come to realise that the tensions surrounding subversive use of technologies cannot be easily resolved. Apart from using information technologies and telecommunications that are foundational to and perpetuate military technology and information warfare, my attempt to inject an “alternative” perspective in wearable computing and doing this necessarily in the context of the “Artist-in-Labs: Processes of Inquiry” residency programme, also suggests complicity in the larger knowledge production economy. Maurizio Lazzarato, in “Immaterial Labor,” discusses how the post-industrial enterprise/economy grounds itself on the manipulation of immaterial labour, “the labor that produces the informational and cultural content of the commodity” (133). These labours, according to Lazzarato, are provided by the likes of scientists, technologists, academics, designers and artists, with skills involving cybernetic and computer control as well as activities (intellectual, creative) that define, fix cultural and artistic standards, fashions, tastes, consumer norms and more strategically public opinions (133). Furthermore, the requirements of production include and incorporate the personalities of immaterial labourers who are expected to become “active subjects” in the coordination of the various functions of production rather than simply being subjected to its command (Lazzarato 134-135).

Fig. 1. (Left) The accelerometer is kept in a little pouch attached to the apron string located above the waist. Fig. 2. (Right) The base unit of fall detector (without casing in picture) is located at the lower pocket of the apron.

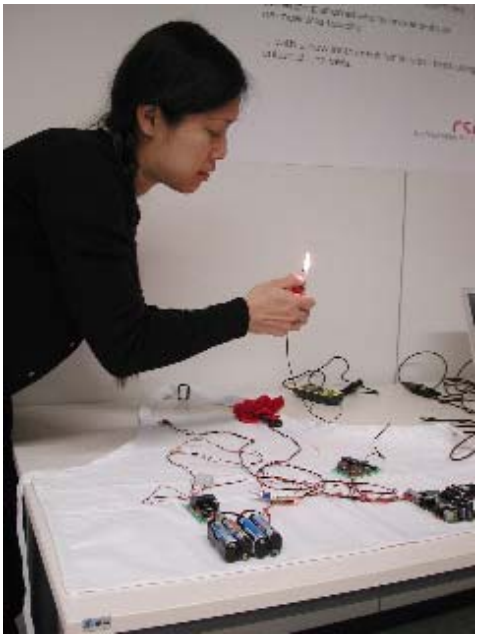

Fig. 3. (Left) Testing and checking the fall detector unit. Fig. 4. (Right) Testing the heat sensor on one of the second set of aprons with a lighter.

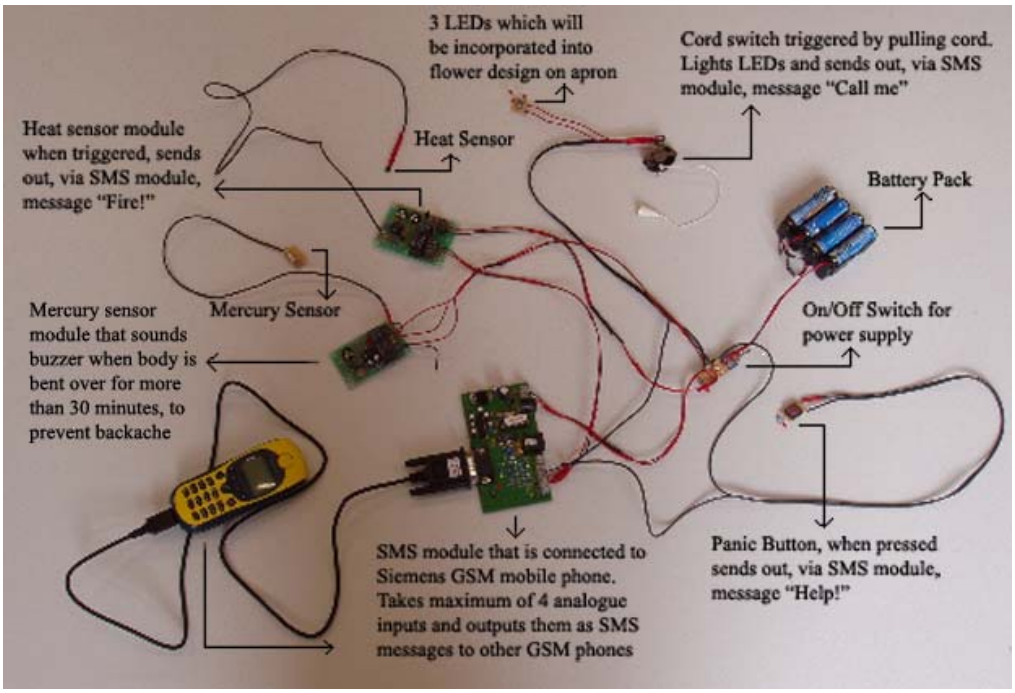

Fig. 5. (Above) Technical layout of one of the second pair of aprons detailing the sensors and what they can do.

In other words, the subjects needed here are those capable of communication (and imagination); however, this communicational relationship is "completely predetermined in both form and content; it is subordinated to the 'circulation of information' and is not expected to be anything other" (Lazzarato 135).Lazzarato, therefore, argues that this "mandate to 'become subjects of communication'" is "even more totalitarian than the earlier rigid division between mental and manual labor (ideas and execution)" (136). This is in line with what Baudrillard notes, highlighted in the previous chapter, that the production of active subjects whose production/consumption of signs and codes provide the condition of possibility for the reproduction of the political economy. Furthermore, this new ideological structure is subtler and yet total in its control and manipulation of productive energies, in the continued consumption and perpetuation of its codes.

In a clear departure from the Taylorist model of organisation, immaterial labour is the interface between production and consumption through the process of communication (Lazzarato 138). The main product generated by immaterial labour is not only information but also subjectivity. Lazzarato points out that the "concept of immaterial labor presupposes and results in an enlargement of productive cooperation that even includes the production and reproduction of communication and hence of its most important contents: subjectivity" (140). In short, immaterial labour, by being the interface between production and consumption, produces social relationships of innovation, production and consumption that are then translated into capital relations (Lazzarato 138). Consumption here is not limited to consuming commodities and instead of being an act of destruction, consumption is necessary for new creation (Lazzarato 141). Within the cycle of immaterial production, the process of valorisation is crucial and consumption is inscribed a priori in the product since it is necessary for creating new products (Lazzarato 140-141). Immaterial labour, therefore, underpins capital relations by producing subjects that consume the information they produce in order to guarantee the next cycle of immaterial production.

As with the case of the "Artist-in-Labs: Processes of Enquiries" residency, its main objective is to produce art-science hybrid subjects. The organisers and partners of this art residency indicate that placing artists in scientific environments can be productive in terms of new knowledge and innovation for both artists and scientists. Moreover, they highlight, artists can help link science to the public and/or bring up ethical or social issues to be accurately addressed in research (Scott, "Introduction" 6). Artists can even be "catalyst[s]" and "liberator[s] for science" (Scott, "Introduction" 7). Jill Scott, the main organiser of the residency elaborates that the

art-science hybrids can then become a "solid base for valuable innovation, production, distribution and social-cultural consumption potentials" ("Suggested Transdisciplinary Discourses" 24). Quoting several famous feminists of science, including Haraway, on their valorisation of the role of artists and women in science, Scott points to another project she is involved in, called the Relational European Art and Science Network, with the objective of exploring solutions to shared creativity by training more artists in science. She highlights, "we can also harness the potentials of transdisciplinary practice to involve women in a more creative approach to science" ("Suggested Transdisciplinary Discourses" 28). Scott's and my narratives, which are inspired by Haraway's discourse as well as the rhetoric by the other organisers and partners of the art residency, are based on an ideological component and process of valorisation.[16] In all cases, the production of active hybrid subjects of art, science and technology is directly productive because "the role is to construct the consumer/communicator – and to construct it as 'active'" (Lazzarato 143). For Lazzarato, the ability of immaterial labour to produce subjectivity and economic value at the same time indicates "how capitalist production has invaded our lives and has broken down all the oppositions among economy, power, and knowledge" (143).

I argue however that Haraway's proposed "oppositional cyborgs" not afraid of "disrupted unities" and able to take pleasure in high-tech culture in hope of "changing the rules of the game," may inspire works that end up exacerbating "the Complex" ("A Cyborg Manifesto" 307-309). The notion of taking pleasure in high-tech culture also obfuscates the fact that it is not only the "most vulnerable" that are subjected to the "massive intensification of insecurity and cultural impoverishment" in the

[16] I have also been involved in organising a similar art residency project that puts international artists in new media and technology laboratories in Singapore, as part of a juried exhibition event of the International Symposium on Electronic Art 2008. See <http://www.isea2008singapore.org/>.

"informatics of domination" (Harraway "A Cyborg Manifesto" 309). In the relation with capital, immaterial labour itself is also subjected to precariousness, hyper-exploitation, mobility and hierarchy (Lazzarato 137). I am not denying that there is a divide between "the most vulnerable" and "the progressive people." In fact, such a divide is becoming increasingly wide and yet forgotten by the technological class (I will return to this point later). In this sense, Haraway's reminder of the dual nature of empowerment and her call for responsibility for our creations, remain pertinent. However, her appeal for a cyborgian subjectivity that takes pleasure in high-tech culture can be misappropriated to feed today's technological economy, where hybridisation is the order of the day and where continuous production/consumption is exactly based on the creation of needs and desires.

To be fair to Haraway, her call for transgressions was made in 1984 at the height of the Cold War arms race, threat of nuclear warfare, and fractures within American feminism and its uneasy relations with essentialism and techno-science. In today's world where cyborgian subjects are increasingly celebrated and extolled, however, it is time to re-look the usefulness of such a subject position. Nigel Thrift, in "Donna Haraway's Dreams," observes that while Haraway's cyborg was predominantly "organismal" in character, in today's context of pervasive computing, her notion of hybridisation is undoubtedly hastened, with the accompanying radical surveillance and control by technologies, and new ways of defining what body and human community are (189-195). Additionally, Thrift points to Haraway's treatment of the economy as failing to take into account the contemporary enterprise concerned with realising the sensible – desire, hopes, beliefs and pleasures – that precedes production. In other words, Haraway's strategic commandeering of the cyborg metaphor to contest its ontology and meaning in order to push for a post-identity

politics is not without problems today.

Although Haraway's cyborg is very complex and encompasses both real and metaphorical instances, the valorising of the cyborgian subject can end up becoming a mandate to become subjects of communication, as Lazarrato observes, which can be more totalitarian than earlier rigid divisions of labour, and more oppressive than earlier forms of dualisms. Indeed, Virilio argues, the invasion of the body by machines or what he terms the "endo-colonization of the body by technology" moves beyond prosthesis to a new form of eugenism, forced onto humans who do not need or want them (*Virilio Live* 42). He observes that in this "attack" of the body, coupled by ubiquity, the able-bodied paradoxically is modelled after the disabled and equipped to control his or her environment without much effort or physically shifting (*Virilio Live* 33). For Virilio, the "tragedy of the fusion of the 'biological' and the 'technological'" results in the body being subjected to the topology of the technology – its laws of efficiency and proximity (through miniaturisation, speed and ubiquity) and the resulting laws of least effort and least action (*Virilio Live* 50-51, 57). As highlighted in the previous section, the corresponding loss of journey in the interactive, "real-time" communication space of information, then encourages a deliberate limiting of the body's area of influence to a few gestures or impulses (Virilio, *Open Sky* 15-17) or a general inertia. When the journey becomes needless, there is a loss of solid ground, the "playground of being in the world" (Virilio, *Virilio Live* 34). Ultimately, the "freedom" achieved by the transgressions between humans and machines in information and communication spaces that is also promised by Mann, paradoxically, leads to a general entropy or inertia of the body and a "frailty of reasoning" (due also to speed) as the field of action vanishes (Virilio, *Speed and Politics* 143).

Nevertheless, it is worth keeping Haraway's cyborg for its ability to see from both perspectives. Ingrid Hoofd, using Haraway's notion of complicity to structure her writing, substantiates the "frailty of reason" due to the speed of communication and the loss of fields of action in her analysis of feminist networked politics. In "Feminist Activism in the High-tech West: The Complicity of Transversal and Networked Politics of Speed," Hoofd looks at contemporary feminist networked politics as practiced in three separate digital spaces, namely "Undercurrents," "Nextgenderation" and "Indymedia" (19-35). She observes that there seems to be a "false fantasy" in these feminist networked politics of their progressiveness and strength of their alliances through common goals. This she argues is exaggerated by the instantaneity of online connection and the notion of online spaces as "neutral," which then facilitates the "imaginary erasure of the situated embodiments within geo-political structures of power" ("Feminist Activism" 19). Hoofd maintains that these feminist networked politics, in a departure from Haraway's self-conscious politics, display a lack of self-reflexivity of their complicit relations with new media and military technologies, an effect, she argues, of current neo-liberal globalisation and its technologies that function on speed and circulation ("Feminist Activism" 20, 23).

Drawing from the works of John Armitage and Gayatri Spivak, Hoofd uses the term "speed-elitism" to describe the current proliferation of optimistic discourses or what she calls "suppression of despair" ("Feminist Activism" 22-23). These discourses are the ones that stress on "connection, instantaneity, liberation, multiplicity and boundary overcoming, which go hand in hand with the validation of highly mediated spaces for action and communication between allied groups" ("Feminist Activism" 23). Such discourses then erase their violent colonial and patriarchal history, while enforcing an imaginary "unity of struggles," through the

"myth of 'truly' allowing for radical difference and multiplicity within that space" ("Feminist Activism" 24). In this enforcement of "unity of struggle," difference is excluded a priori through the larger scheme of "alliance" ("Feminist Activism" 25), and connections are created to supposed "radical others," who in fact reside very much in the centre of power despite their "narratives from the margin" ("Feminist Activism" 28). Speed-elitism's emancipatory dream, Hoofd further points out, is based on a humanist conception of an active, productive, resistant subjectivity, capable of "asserting its individuality in opposition to power" ("Feminist Activism" 25).

Similarly using Haraway to structure her MA thesis, "Cyborg Ontology and Politics in *Intelligent Nation* Singapore," Shirley Soh argues that the iN2015 Masterplan is speeding up the cyborgisation process in Singapore. This process is marketed under the promise of empowerment in a digital future for everyone. Yet, the iN2015 cyborg, Soh observes, is based on a one-dimensional technological citizenship that obliges citizens to be technologically knowledgeable to the extent of being mainly media-savvy users and consumers of new technology. Soh argues that the iN2015's promise of empowerment is driven mainly by consumption and living a life of technicity, addicted to speed, constant innovation, and the hyperreal.

On June 16 of this year, Soh and I were invited to be part of one of AWARE's monthly roundtable discussions. AWARE or the Association of Women for Action and Research is one of Singapore's leading gender equality advocacy group, of which Soh and I are members (AWARE). Soh was the speaker, and I the respondent, of the topic "Intelligent Nation? Technology, Gender and Empowerment in Singapore." The session was chaired by Robin Ann Rheaume, the Website, IT & Volunteer Consultant of AWARE. It became clear during the roundtable discussion and in the aftermath of

the session (via email correspondence with Corinna Lim, the Executive Director of AWARE) that Soh's and my critique of technological empowerment did not sit very well with the audience and members of the association. There was a sense of impatience with our critique that was read as anti-technology and a result of being "less immersed" in technology, which perhaps have to do also with our age, compared to the "younger" audience. This impression was perhaps further reinforced by Rheaume, who started the question-and-answer session by taking a count of those who have or do not have a Facebook account, which I *chose* not to have one. This choice is of course a luxury.

The episode at AWARE clearly demonstrates what Hoofd describes above as the "suppression of despair" and "unity of struggle" amongst speed-elites, intent on seeing only the empowering side of information technologies and telecommunications ("Feminist Activism" 22-24). But such a narrow view of technology not only measures our relationships to technology and know-hows based on what we have and/or use, but also (as pointed out by Soh) is un-reflexive. Soh points out in our email exchanges with Corrina, AWARE's use of social media tools for out-reach and activism is already targeting a certain audience (educated, computer-savvy, middle-class, also probably English speaking), which Soh contends is fine so long as AWARE realises it is promoting a kind of feminism that includes some and excludes others. What is more crucial for Soh is the impact of new technology on those who are already marginalised, and for those who are empowered, what this empowerment really means?[17]

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[17] Email correspondence between myself and Corrina, 17 June 2011, 1.45PM, 2.44PM, 4.06PM, 6.05PM; email correspondence between Shirley and Corrina, 20 June 2011, 12.29AM. For AWARE, see <http://www.aware.org.sg/about/overview/> and for the roundtable discussion, see <http://www.aware.org.sg/register/aware-roundtable-discussions/>.

2.4 Re-assessing the *Smart Apron*: Some Concluding Thoughts

The *Smart Apron* remains incomplete. Yet, its incompleteness is perhaps its greatest strength; otherwise, this dissertation would not be speaking the way it speaks now. I have come to realise that in my use of cybernetic technologies, I have been enframed by the technologies' rhetoric of freedom, empowerment and control. I have come to realise that my mobility and empowerment will always come at the expense of another, while my "liberation" project simulates difference by inevitably homogenising the foreign domestic workers as victims and naturalising their position in servitude. The homogeneity of women as a stable category is produced here not through "biological essentials," but through "secondary sociological and anthropological universals" – such as the basis of a shared oppression – that elides "women" as a discursively constructed group with "women" as material subjects with their own history (Mohanty 53). In other words, in my desire to represent the working conditions of certain foreign domestic workers in Singapore, my act of differentiation, paradoxically, is premised on the creation of some enforced Same-ness. Crucially, the "difference" produced ends up as information for circulation and consumption. Feminist production of active subjects of science and technology, as in my case, is complicit with and increasingly being demanded by the current technological political economy. The next chapter highlights Singapore as an example of how such needs and desires for the consumption and production of information technologies and telecommunications are coded through the political economy of the sign and subject. Through the iN2015 Masterplan women are used, metaphorically and materially, by the Singapore government to play active roles in sustaining the values of the ruling elites, the logic of the technologies, and ultimately, our own subordination.

Chapter Three:

The Visible and Invisible: Consumption and the Political Economy of the Subject in the iN2015 Masterplan

> "It is the cunning of form to veil itself continually in the evidence of the content. It is the cunning of the code to veil itself and to produce itself in the obviousness of value. It is in the "materiality" of content that form consumes its abstraction and reproduces itself as form. That is its peculiar magic" (Jean Baudrillard, "For a Critique of the Political Economy of the Sign" 80).

3.1 Coding Needs and Desires: Introducing the Strategies of the iN2015 Masterplan

The previous chapter has shown, through my wearable artwork the *Smart Apron*, how the wearable computing discourse of Steve Mann and socialist-feminist discourse of Donna Haraway are different in terms of their politics, values and ethics, but how, ultimately, the mobile cyborgian subject lends itself easily for misinterpretation and misappropriation by today's technological systems. This chapter brings my arguments even closer to home by looking specifically at the iN2015 Masterplan, and how its championing of active technological subjects feeds back into Singapore's technological economy and military. Drawing on Jean Baudrillard's point on the political economy of the sign that then produces the political economy of the subject, I argue that the iN2015 Masterplan, including its digital video *Imagine Your World iN2015*, socially shapes subjects through the latter's consumption of a manufactured system of codes and meanings that naturalise needs and desires, and their correlating use value and exchange value. These codes, constructed through the language of new media technologies and discourse around globalisation and its technologies, become

productive forces in cultivating subjects in line with the Singapore ruling elites' needs and requirements.

Specifically, I argue the iN2015 video functions structurally for Singapore to narrate and broadcast itself as a global city, vis-à-vis pervasive computing, to both its populace and an international audience, shaping their desires, while obscuring the harsh demands of globalisation. In other words, the iN2015 video embodies the larger discourse of Singapore's ruling elites. It harnesses identity politics to naturalise social relations and normative relationships with information technologies and telecommunications, while disguising the upheavals caused by the global restructuring process, abetted by the same technologies. Straddling the "visible" and "invisible" at will, the iN2015 video repeats the national myths of "origin" and "tradition," but departs from the conventional discourse of survival (or crisis) through its rhetoric of empowerment, control and inclusion in the use of information technologies and telecommunications, to produce the active technological subjects needed by Singapore's complex technological systems. Additionally, by combining Baudrillard's theory of simulacra, Virilio's observations of chronophotography and its aesthetics of disappearance, and David Rodowick's critique of digital culture, I argue that the transparency of the official discourse is matched by the transparency of new media technologies. In the disappearance of the discursive technologies, the needs and desires of Singapore's ruling elites are perpetuated by the populace as their own, that in turn, subject everyone under the technologies' digital logic of abstraction (general equivalence), control and participation (interaction).

This chapter consists of three main sections. In the first section, I focus on how the iN2015 video, through cleverly constructed and selective use of the "Asian values" ideology, the valorisation of "the middle-class," "foreign talent" and

"cosmopolitans," points to globalisation and nationalism as restructuring processes that are sustained through identity politics, which naturalise a variety of hierarchies and subjectivities. In particular, I highlight how women as metaphors for development are deployed by Singapore's ruling elites to subject female and feminine labour structurally, institutionally and morally to take active roles not only to ensure continued capitalist development, but also to perpetuate the hegemony of the ruling class, its patriarchal and neo-liberal values, and eventually, women's own subordination.[18]

In the next section, I look at how the iN2015 video's depiction of pervasive computing as positively transformative, efficient and seamlessly integrated into people's daily lives, reinforces and normalises prevalent views of such technologies as empowering for everyone, when, in fact, its consumption (in both material and immaterial forms) effects a disciplinary code for all. This section highlights the use of both material and immaterial means by the iN2015 Masterplan to expand technologised spaces and encourage the active consumption of information technologies and telecommunications. Through the building of the necessary infrastructures, enacting policies, and the rhetoric of empowerment, control and inclusion, the iN2015 Masterplan creates and valorises technological subjects, active in the production and consumption of information technologies and

[18] Although the focus of my dissertation is on how structures produce subjects based on coding needs and desire through the manipulation of signs, this does not mean that the structures are themselves neutral and un-gendered. In fact, the post-Cold War techniques and technicity as well as the neo-liberal values that imbue these structures are arguably masculine. By this, however, I do not mean that they are exclusively man-made structures. Rather, certain women too share these masculine values, just as certain men are against such rationality. Therefore, my use of the terms "patriarchal" and "patriarchy" encompasses a set of beliefs, values, practices that are aligned with masculine thoughts and rationality, which can be shared, expressed and perpetuated by men and women alike.

telecommunications. Using Baudrillard's concept of consumption as a productive force, I show how the nurturing of such active technological subjects eventually feeds back into Singapore's technological systems. Hence, I situate Singapore, via the iN2015 Masterplan, as a prime example of mutated capitalism where social control is diffused, motivated, defined by market imperatives, as well as underpinned by consumption and the digital logic of control, participation and its feedback loop. In this cycle of consumption/production, the paradoxes of how the positive effects of the iN2015 Masterplan and pervasive computing are exactly due to the negative effects of the Masterplan and its technologies are made invisible.

In the last section, I summarise and reiterate the conditions of possibility for the iN2015 Masterplan and Singapore's technological economy. Apart from looking at the mobilisation of the political economy of the subject through discourse, this section also looks at the role of new media technologies in coding needs and desires, and shaping sociality by what it makes visible and invisible. Here, I connect Paul Virilio's concept of the aesthetics of disappearance, and David Rodowick's study of digital technologies and its impact on moving images, to Baudrillard's observations of the cunning of the form to hide itself in its content, highlighted in the epigraph. I point to how regardless of the changes in the contents of the iN2015 Masterplan website and video, the iN2015 project of perpetuating technological consumption remains, precisely because of the transparency of its discourse as well as the transparency of its technologies.

3.2 The Political Economy of the Sign and Subject in the iN2015 Masterplan: Women as Metaphors for Development

Globalisation has traditionally been seen and understood primarily, as an economic (followed by political) and universalising process, with trans-national corporations, states, financial institutions and information technologies and telecommunications playing key driving roles. Conversely, focus on regional, cultural and sociological relations points to globalisation as specific and heterogeneous in effects. In either case, global restructuring is an on-going process practiced and sustained through signs and metaphors that naturalise various hierarchies and subjectivities (Marchand and Runyan 1-22). The rise of neo-Confucianism or a "hypermasculinised" code of development and its corresponding "hyperfeminine" models in East Asia and Singapore, for example, attest to the interaction between the structures of capitalism and patriarchy (Truong 133-165; Ling, "Sex Machine" 277-306). These codes also demonstrate how the construction of tradition, ironically, far from negating and being negated by modernity is crucial to the process of modernisation that in return maintains the hierarchical status quo. Yet while globalisation depends on making visible, sanctioning and maintaining a given social code, it also, paradoxically, hinges on the "politics of forgetting," a process of erasure driven by powerful dominant groups such as global capital and the neo-liberal state, who "actively control and manipulate space" in order to maintain existing power structures (Lee and Yeoh 4). In the iN2015 Masterplan, this is most clearly demonstrated in its discourse around the valorised "foreign talent," "cosmopolitans," "the middle class" and their corresponding "invisible" Others, particularly the foreign workers and foreign domestic workers. Thus, the visible and invisible equally structure the discussion of global restructuring at the level of representation, identity and everyday life.

Everyday life is a site of struggle since this is where the economic, political, material, cultural and symbolic converge; where "different portions of power and resources, their presence or absence, are keenly felt" (Kim 7), and where experiences and identities are produced and/or contested and subjectivities constituted. Significantly, media consumption plays an integral role in the "politics of everyday life" with its "poaching, tireless, invisible, quiet but potentially transformative activity" (Kim 8). Media's ubiquity and its potential to affect meaning making in everyday life are two fundamental yet paradoxical points in the politics of the iN2015 Masterplan. Crucially, the iN2015 Masterplan via pervasive computing will intensify new media's ubiquity and consumption in everyday life, as well as their powerful capacity to affect meaning making. In the case of the iN2015 Masterplan, new media is used to reinforce not only the patriarchal and neo-liberal values of the ruling elites, but also the continued consumption/production of new media technologies and their codes.

A case in point is the iN2015 digital video that accompanies the iN2015 Masterplan. As part of the iN2015 Masterplan launch, a nation-wide competition called *Express iT! iN2015* was held to generate ideas and "visions of a colourful infocomm future for Singapore" (IDA "Express IT! iN2015 Competition"). It drew more than three thousand entries over a period of two months, with sixty percent coming from primary schools, eighteen percent from secondary schools and pre-university institutions, and twenty-two percent from the public. Co-opting some of these visions, the six minute-six-second video, entitled *Imagine Your World iN2015*, was produced by IDA to show-case what Singapore will be like in the year 2015, when the city-state would be thoroughly integrated with pervasive computing. Specifically, the iN2015 video depicts snapshots of how life will be for a middle-class

Singaporean-“Chinese” family as they go about their daily lives. The seven characters and roles identified in the video are Nancy, a mother who works as a digital animator; Mark, the father and manager of a logistics company; David, their son and primary school student; Karen, their teenage daughter and consumer; Madam Lee, the grandmother and senior citizen; Tobey, a European-descent male expatriate and executive of the same logistics company as Mark; and Sazali, the male “Malay” taxi driver.

The video begins with a time-lapse image of the Singapore urban landscape and cuts to Nancy at work. As she orally commands multiple screens to switch on and proceeds to have a meeting with various people from different parts of the world, each occupying a screen, Nancy’s earpiece churns out real-time translation of their respective languages to English. After her meeting, Nancy removes her wristwatch, which morphs like liquid metal into a small handheld device allowing her to send a text email to Sazali to pick up her son, David, from his excursion at the zoo. While reading the day’s news through a transparent tablet, Sazali receives Nancy’s email and proceeds to call up a map on the same device, showing the location of the Singapore Zoological Garden and the distance from where his taxi is to the zoo. The next scene is of Mark driving on the highway. By pressing one of several buttons near his steering wheel, Mark makes a call to Tobey, who answers it through a pair of sunglasses (see fig. 1). In their mediated communication, Mark gets a view of Tobey in his new apartment and Tobey “sees” Mark as the latter continues to drive. Through his sunglasses, Tobey is also able to receive the shipping invoice sent from Mark for customs clearance and to call up his “sexy” Asian female avatar to complete the task (see fig. 2). The avatar proceeds to inform Tobey that his favourite performance, *Misty*, is on show at The Esplanade – Theatres on the Bay, books the tickets for it and

sends Mark the details, as instructed by Tobey (see fig. 3). Meanwhile, Mark turns off the expressway, and is informed by the "intelligent agent" of his car the number of available parking lots in a building nearest to his location. The scene then transitions to images of satellite maps, to another scene at the zoo.

Fig. 1. Tobey communicating with Mark through a pair of sunglasses. Source: Info-communications Development Authority of Singapore (IDA Singapore). All copyright and intellectual property rights in the digital images are owned by IDA.

Fig. 2. The avatar as she appears on Tobey's sunglasses. Source: Info-communications Development Authority of Singapore (IDA Singapore). All copyright and intellectual property rights in the digital images are owned by IDA.

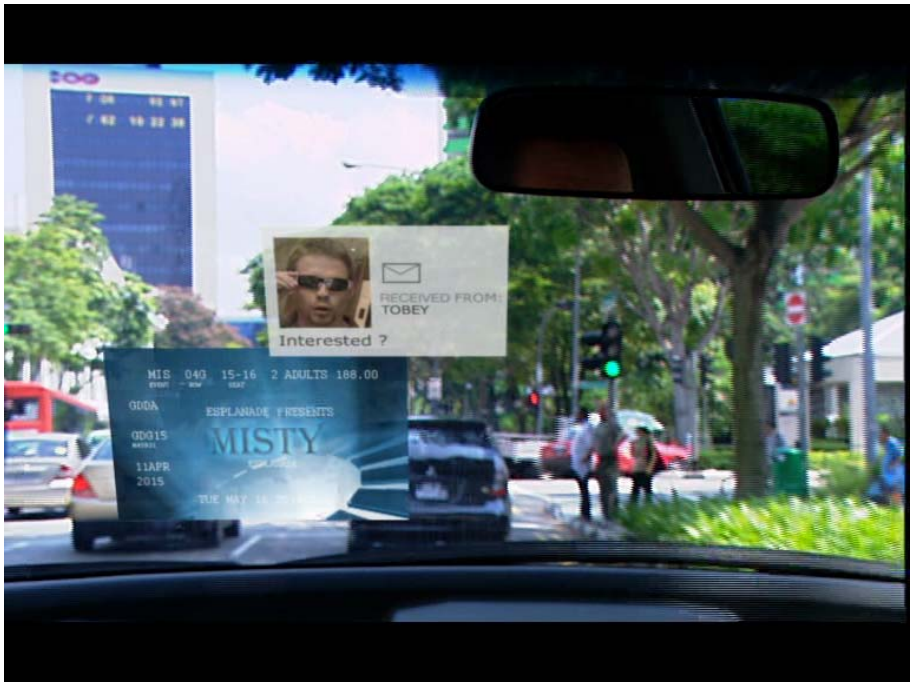

Fig. 3. Mark receiving Tobey's message about *Misty* on his car windscreen. Source: Info-communications Development Authority of Singapore (IDA Singapore). All copyright and intellectual property rights in the digital images are owned by IDA.

At the zoo, David is on a class excursion and using a similar transparent tablet to Sazali's, he "scans" a rhinoceros and proceeds to call up his virtual "Malay" male "professor" to explain how the name for the animal came about. David then shares this file with his classmate seated next to him by simply using his finger to select the file and dragging it out of his screen in the direction of his classmate's tablet. David continues to "scan" many animals and insects at the zoo before receiving an audio-visual message from his mother, Nancy, informing him that she is running late and has arranged for a taxi to pick him up and send him home. As Sazali arrives at the zoo, David receives an email of his arrival. Meanwhile, David's sister Karen is at a shopping mall alerted to a particular brand of lipstick that is on sale through a different hand-held device, which she then uses to track her location to the sales counter. When she arrives at the counter, Karen calls up a picture of her mother, Nancy, on the device and by scanning the lipstick across it, a menu of colours appears on the screen before different shades of colours are juxtaposed on the lips of Nancy's image. After making her choice, Karen proceeds to pay for the lipstick by simply scanning the palm of her hand on a black tablet at the payment counter.

The following scene shows Madam Lee, a senior citizen, exercising at the balcony of her home. An alarm goes off on her wireless heart rate monitor worn on her wrist. A screen is then projected from the device with an image of her "concerned doctor" enquiring after her as the system has registered her heart beating too fast. She informs "him" that she might have exercised for too long and thanks "him" for his concern. The "doctor" is reassured and signs off. In the final scene, Madam Lee enters with a cake and it appears that it is Nancy's birthday. Mark, her husband, has gotten her tickets to watch the theatre performance *Misty*; Karen has bought her the lipstick, and David has a different surprise for her. As the family gathers round to have their

dinner, David inserts a memory card into a device with a crystal ball. Instantly the dining room is transformed into a “jungle” with moving images of flora and fauna captured by David at the zoo (see fig. 4). While the family enjoys the simulated environment, David, in a voice-over, wonders what else will be invented in the next ten years before the scene cuts back to the time-lapse shot of the urban landscape of Singapore.

Fig. 4. The family in their dining room as they enjoy the simulated environment created by David. Source: Info-communications Development Authority of Singapore (IDA Singapore). All copyright and intellectual property rights in the digital image are owned by IDA.

While the iN2015 video seeks to present a pristine and novel image of pervasive technologies as they manifest themselves in the everyday life of the Singapore populace, there is nothing actually new about the visions of the technology or the rhetoric of everyday life used. I address this point in the next chapter. What I

want to highlight in this chapter is how the video deploys the political economy of the sign and subject to naturalise normative relationships with new technologies, disguise the upheavals caused by the intensification of such technologies and the larger global restructuring process, through the myths of “origin” and “tradition.”

In “For a Critique of the Political Economy of the Sign,” Baudrillard critiques classical (Marxist) political economy for failing to take into account the political economy of the sign, its systems of value, exchange and circulation, in the organisation of relations (60-100). According to Baudrillard, signs are arbitrary systems of classification, grouping and categorisation that then become falsely transparent codes used to legitimise production and social relations. However, these codes are not forced; rather, they operate under a complex arrangement of needs and desires for social meaning and difference, where use value and exchange value are constructed as binaries and reduced to the status of utility. In this sense, subjects as much as objects are equally exposed to use, regardless (or precisely because) of their oppositional construction. Hence, the political economy of the sign is an arbitrary construct of subjects, objects, their values and hierarchical relations – codes that then give rise to and are in turn sustained by the political economy of the subject.

With the political economy of the subject, Baudrillard maintains, needs and desires work hand in hand with the political economy of the sign, use value and exchange value, to produce disciplinary forces that valorise individuals to become useful subjects. Paradoxically, these needs and desires are simulated and naturalised as something original to the subject and beyond the discursive and material construction of the political economy. Baudrillard argues, “every great social order of production ... maintains an ideal myth, at once a myth of culmination and a myth of origin. Theology supported itself on the myth of the fulfillment of man in the divine

law; political economy is sustained on the great myth of human fulfillment according to the natural law of needs" ("For a Critique of the Political Economy of the Sign" 77). The power of such myths, according to Baudrillard, is their ability to create "transparent" relationships between humans, the products of their labour, their instruments, and crucially, the very conditions of their beings. As highlighted in the epigraph, the ultimate intelligence of the code is its capacity to abstract itself, make itself invisible even as it simultaneously produces content and the consciousness to receive the content it produces (Baudrillard,"For a Critique of the Political Economy of the Sign" 80).

The need for capitalist and technological development in Singapore is founded precisely on a series of myths that eventually became transparent codes regulating local subjects. Historically, at the end of British colonial rule, after Singapore was kicked out of the Federation of Malaysia and to assuage apprehensions, the ideology that the nation's survival is tied to and can only be achieved through economic development was championed (B. H. Chua, "Racial-Singaporeans" 30-31). Capitalism's promise of material comforts, underpinned by the logic of individual competitiveness, meritocracy and private accumulation, were used to persuade and "unite" an ethnically diverse population to see this form of development as just, impartial and desirable (B. H. Chua, "Racial-Singaporeans" 33-37). The discourse of survival (or crisis) as well as the promise of material comforts, persist today and have resulted in an internalised national psyche of understanding capitalist development as inevitable and the quality of everyday life as being economically-determined and materially measured (Koh 186-187). Equally, these discourses have also created disciplined, competitive subjects "blind" to how the capitalist ideology, despite its claims to "unite" the population, fundamentally makes people compete against each

other, resulting in ambivalences to the structural injustices based on racist, patriarchal, heterosexist and class relations of rule. The notion of meritocracy, for example, has created subjectivities of self-justification for those who are successful and self-deprecation for those who are not (B.H. Chua, “Racial-Singaporeans” 33), while valid objections to such an alienating ideology underpinned by competition and consumption, were instead silenced as being “Islamic fundamentalist” and “economically irrational” (PuruShotam, “Disciplining Difference” 88).

Currently, with the advent and expansion of globalisation, the use of discourse as a disciplinary technology to regulate the Singapore populace has intensified. Aaron Koh, in “Living with Globalization Tactically: The Metapragmatics of Globalization in Singapore,”observes how the leaders of Singapore have countered the unpredictability of globalisation by mobilising “a rhetoricist position to persuade its populace to accept the implementation of certain policies” (179-201). By defining globalisation narrowly as being about “competitiveness,” “innovation,” “creativity,” “techno/entrepreneurship,” and “foreign talent,” it is deployed as a mechanism for the government to shape, normalise and instrumentalise the Singapore polity in the name of “making globalisation manageable” (Koh, 180). As such, Koh highlights, the fundamental logic underpinning Singapore’s management of globalisation is “an instrumental rationality,” a “calculated pragmatism” aimed at “making the Singapore economy tick ... at whatever cost” (181). Koh continues to point out that the art of government in Singapore works not only by managing the territory but also by influencing the populace’s dispositions of thinking and behaving. This is achieved through a combination of both “totalising forms of power,” such as public policies, and “individualising forms of power,” such as cultivating a certain mind-set, targeted,

especially, on maintaining Singapore as an economic powerhouse (183-184).[19] Overall, the "tactical" deployment of public policies and control of individual thoughts and behaviour are invariably performed using culturalist assertions that valorise "traditions" and values centred on the construction of "place," "home" and "roots," in an era of de-territorialised market and de-terroritorised nationalism (196).

The iN2015 video complements the Singapore government's long-standing strategies of using the "home" to construct normative relations with globalisation and pervasive computing. Specifically, the final scene of the video, where three generations of the family gather to have their dinner and celebrate Nancy's birthday (see fig. 4) is instructive of how the construction of the home (ways of life, eating, et cetera) is crucial for the social reproduction of culture and specific subjects – in this case, conventional subjects engulfed literally by modern technologies and virtuality. "Home," "tradition" and "origin," hence, play central roles in Singapore's nationalist project and its production and mobilisation of conventional yet contradictory subjectivities that fit the needs and desires of the ruling elites.

In their analysis of capitalist development in East Asia and Singapore, Truong Thanh-Dam and L.H.M. Ling separately argue that ideological constructs in this region are predominantly based on a neo-Confucianist, "hypermasculinised" code and their corresponding "hyperfeminine" models. Under this particular model of development governments cite "Asian values" to argue the dominance of community over the individual to justify state sovereignty and the primacy of economic development over political freedom, while narratives of the virtue of self-sacrifice are

[19] Some of the maneuvers used by the government that Koh discusses, include: the Foreign Talent policy that aims to attract mobile talent/capital (187); the language campaigns (Speak Mandarin Campaign and Speak Good English Movement) that strives at meeting the needs of (new) centres of capitalism (189-190); and the National Education programme intent on inculcating Singaporean youths with forms of Singaporean identity and patriotism against the tides of globalisation (194).

used to discipline women, the labour force and society at large (Truong 145-147). Based on this neo-Confucianist "hypermasculinised" code, women also become metaphors for development in the service of the household, the state, the economy and capital that in turn are used to regulate female and feminised labour (whether performed by men or women) and their roles in the family and society. This regulation of subjectivities is achieved through cleverly cultivated images where select Confucian ethics and values are extended from the home to the political economy and the larger globalisation process, which in turn act to induct these labour forces into service structurally, institutionally and morally (Ling, *Postcolonial International Relations* 162-165).

The Singapore brand of the "Asian values" ideology is a hybrid of *Pancasila* in Indonesia and select Confucian Ethics, resulting in a hierarchical setup of nation before community, and society before self. In this setup, the family is made the basis of society, and the individual placed in the care of the community, while racial and religious harmonies are upheld, just as consensuses, and not conflicts, are promoted (Englehart 561). This carefully constructed ideology and its focus on communitarianism, self-sacrifice and the patriarchal, heterosexual family as the basic unit of society, was promoted by the government particularly in the 1980s, as a reaction to what they established as a growing "Western" liberal individualism and threats to the Singapore society and family (B.H. Chua, "Asian-Values Discourse" 573-592). More importantly, this ideology also functions as a pre-emption to the growing popularity of the Opposition parties in the 1980s and, therefore, threats to the ruling party's own position (Englehart 551-554).

The selective use of Confucian Ethics that underpins Singapore's brand of "Asian values" thus springs more from political and ideological reasons to militate

against the globalised notions of democracy and human rights, rather than from any traditional mores of the population (Englehart 549).[20] Ironically, prior to the introduction of "Asian values," the Singapore government was actively promoting the English language, culture and a different kind of national identity – that of "rugged individualism" – while systematically destroying the network of traditional Chinese schools (best placed to advocate Confucian Ethics) because they were seen as hotbeds of communism (Englehart 555-556; H. C. Chan, "Nation-Building in Southeast Asia" 12). This shift to "Asian values," premised on a select neo-Confucianist focus on communitarianism, self-sacrifice and deference to paternalistic authority, therefore, is an astute move to position the ruling elites as "virtuous men and rulers" (Englehart 558-559), and the general population as uninterested or unsuited to democratic ideals and individual rights (565).

Indeed, Geraldine Heng and Janadas Devan, in "State Fatherhood: The Politics of Nationalism, Sexuality, and Race in Singapore," argue that Singapore's brand of Confucianism, which works on the metaphor of state as the family, guarantees the transfer of paternal signifier from the family to the state, "rendering 'natural' an 'omnipotent government'" (208). However, the authors continue, by recuperating the entire history of Chinese culture in a seamless narrative of continuity and cohesion with Singapore's history, the ruling elites problematically reconfigure Confucianism itself under racial and trans-national identity. They also effect an "internalized Orientalism" that submits citizens to "a structure of values which best subtends, with minimal fuss and resistance, the efficient working of state corporatism

[20] Englehart points out that Confucianism is not widely practiced in multiracial Singapore and even among its predominantly "Chinese" population who are a diverse mix, religiously and culturally. Even the majority of the ruling elites (including former premier and now Minister Mentor Lee Kuan Yew, a strong proponent of "Asian values") are English-educated "Chinese," rather than Mandarin scholars well versed in Confucian Ethics (555).

and multinational capital" (206-207). Through their construction of an idealised "Chinese-ness," values that are in line with the requirements of Singapore's modern market economy are valorised, while qualities that are deemed as "undesirable" may be contained and/or excised (207). Consequently, the anti-"Western" rhetoric within Singapore's "Asian values" discourse acts as an ideal regulative machine to process certain aspects of western culture deemed undesirable and a threat to the ruling elites' dominance, while concealing the state's own re-inscription of western modes of discourse and rationality.[21] What are rendered invisible in the ruling elites' discourse are the rich variety of cultures within Singapore society, the diversity and materiality of Chinese history, and the range of contradictory tenets within Confucianism (Heng and Devan 208).[22] Pivotally, the "Asian values" ideology creates and maintains binaries, in order to obscure the neo-liberal rationality underpinning its discourse that seeks to restore class power to the ruling elites.

The Singapore government's attempt to create a narrative of "common origin," (Yuval-Davis 26) through the "Asian values" ideology, is based on essentialised notions of "race," ethnicity and the simplistic view of cultures as static, reified homogeneous phenomena (41). As a result, under the "Asian values" ideology, ethnicity is reduced to culture and culture is in turn essentialised into a simplistic dichotomous framework of "Eastern" versus "Western" values. This ethnic nationalist project, based on identity politics or the politics of difference, constructs the

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[21] Heng and Devan refer specifically to the Singapore government's strategic deployment of genetics and socio-biology in its large-scale social and biological engineering projects to control Singapore's population as instances of state collusion with western institutions of power/knowledge (207).

[22] Englehart makes a similar point when he highlights that Confucianism is not a simple tradition but possesses a complex variety of strands. One of these strands, ignored by the ruling elites, is the liberal strand that emphasises the "tradition of philosophical individualism, a spirit of free inquiry, and a history of criticizing despotic rulers for abuse of power" (560).

"collectivity," defines its "interests" and perpetuates its advantages, by creating collectivity boundaries, dividing the world into binary constructs of "us" and "them" (Yuval-Davis 44), and private and public spaces. Equally important, this project, like many other ethnic projects, requires the constant production and policing of subjects and spaces to fit within the given norm. Women, in particular, "are often required to carry this 'burden of representation', as they are constructed as the symbolic bearers of the collectivity's identity and honour, both personally and collectively" (Yuval-Davis 45). The "Asian values" ideology and the role of women as metaphors for development is most prominently perpetuated by the iN2015 video, through its depiction of idealised femininities with the added promise that "upward mobility" and "control of one's life" can be achieved through the active use of information technologies and telecommunications.

The key role of women as metaphors for development and guardians of Singapore's updated "Asian values" ideology is most prominently played by Nancy, the female protagonist in the iN2015 video (see fig. 5). Nancy's profession as a digital animator is significant, emphasising the Singapore government's belief of the need for "innovative" individuals needed to aid and sustain the technological systems in an age of global competition and dispersed technological installations reliant on information and simulation. Yet while Nancy is depicted as a productive global worker, she is at the same time a productive wife and mother, bearing at least two children and being their primary caretaker by making sure, for example, that David is picked up from school. As and when Nancy is unable to perform her domestic responsibilities, these can easily be transferred to technology and feminised labour often performed by racialised Others, like Sazali the "Malay" taxi driver, or the conspicuously missing foreign domestic workers.

Fig. 5. Nancy as she appears before the start of the iN2015 video, towering over the Singapore urban landscape. Source: Info-communications Development Authority of Singapore (IDA Singapore). All copyright and intellectual property rights in the digital image are owned by IDA.

In this instance, the iN2015 video works simultaneously to valorise and naturalise productive female and feminised labour, while at the same time render invisible, any negative aspects of the global restructuring process and its technologies. The dissimulation of the foreign domestic workers in the home and the foreign workers in the physical construction of Singapore's global city is crucial to the idealised image of the iN2015 Masterplan and fundamental to shaping local consciousness in the acceptance of such a plan. The "disappearance" of foreign domestic workers and foreign workers in the iN2015 video also belies the fact that this "class of people" is subjected to strict controls in Singapore's capitalist development, as compared to the "foreign talent" the city-state is trying to attract.

"Foreign talent" is human capital, in the form of skilled professional and managerial workers in high-end positions, deemed necessary by the state for Singapore to survive within global competitiveness. These workers are given preferential treatment, compared to foreign workers and foreign domestic workers, which include liberal immigration policies for them and their families, the potential for them to become permanent residents, and state grants given to companies to make their hiring attractive to companies. In contrast, foreign workers and foreign domestic workers, who are equally essential to capitalist development, are subjected to strict controls. These include short-term work permits that allow them to be easily repatriated, non-eligibility for permanent residency and dependent's passes (to allow their spouses or children to be with them), prohibition of marriage to Singaporeans, and regular medical examinations for AIDS/HIV, and for foreign domestic workers, pregnancy. Their hire is also discouraged through the dependency ceiling, which regulates the proportion of foreign to local workers, the foreign worker levy (tax), and the security bond, which risk being forfeited from employers if their workers get pregnant and/or go missing (Yeoh, "Migration" 7-9).

The iN2015 video, apart from presenting an idealised image of the iN2015 Masterplan to shape local consciousness, also functions as a broadcast of Singapore's cosmopolitan ideology. The cosmopolitan ideology is a concurrent state-driven, neo-liberal globalisation project, which seeks to re-engineer Singapore as a place for attracting and retaining "foreign talent" (Yeoh, "Cosmopolitanism" 137-151). The cosmopolitan lifestyle projected by the iN2015 video, therefore, operates not only as a mirror of the middle-class way of life for Singaporeans, but also as a looking glass for selective non-Singaporeans to work and settle in the country. In the cosmopolitan discourse, despite the strict controls against foreign workers and foreign domestic

workers, Singapore is painted by the ruling elites as an open, creative, vibrant and "inclusive" global city, with efficient, accessible and advanced technologies capable of high-speed connections to all parts of the globe (Yeoh, "Cosmopolitanism"142). However, while the cosmopolitan subject is valorised as what is needed for the twenty-first century, cosmopolitanism itself is reduced to matters of taste and consumption embodied in the culture of a trans-national capitalist class – a passive form of global citizenship in terms of social and political transformative power but active in terms of capital production and consumption (Yeoh, "Cosmopolitanism" 138).

Cosmopolitanism as a matter of taste and consumption is coded in the iN2015 video by the way of Tobey, the "foreign talent," who recommended the theatre performance *Misty*, showing at The Esplanade – Theatres on the Bay, to Mark and Nancy. This scene functions, on the one hand, in tandem with arts and culture being valorised, through massive infrastructural development like The Esplanade, to signify Singapore as a cultured, sophisticated global city, and a playground for "foreign talent" and mobile capital. On the other hand, the image also works to exhort Singaporeans to adopt a cosmopolitan outlook to the influx of "foreign talent" (Yeoh, "Cosmopolitanism"140-142), an influx presented positively as a simple matter of changing taste and consumption rather than actual threats to job security, livelihoods and ways of life in Singapore. Further to the idealised image for the cosmopolitan-middle-class, the video effaces the possibility that with the proliferation of pervasive technologies and its logic of information "anytime," "anywhere," life in Singapore for this "professional class" such as the "professor" and "doctor" in the iN2015 video (if they are not already replaced by "intelligent" agents) will be impossibly hectic, to say the least.

While it seems that the exhortation of Singaporeans to adopt a cosmopolitan outlook and way of life appears oppositional to the "Asian values" espoused earlier. Quite the contrary, the cosmopolitan discourse and the "Asian value" ideology are really two sides of the same global restructuring coin. In "Globalizing the Regional, Regionalizing the Global: Mass Culture and Asianism in the Age of Late Capital," Leo Ching argues that regionalist imaginary is fundamentally complicit with the globalist project even as they appear oppositional (233-257). In the current global face of capitalism, Ching points out, symbolic exchanges, more than economic and/or political exchanges, have largely become elemental and powerful for the global restructuring process (238-239). In fact, the conscious production of difference "liberates" Asia as a market and "Asian-ness" as a spectacle and commodity to be consumed in the globalised capitalist system (Ching 241). Here, again, women as metaphors for development play key roles. In the iN2015 video, this is best exemplified by the female avatar as the subservient sexualised Asian "woman as service" (Ling, *Postcolonial International Relations* 145-146), aiding the state's ironic appeal to "foreign (white, male) talent" to work, play and stay in Singapore.[23]

The consumption of "difference," to briefly reiterate Baudrillard's observations highlighted in chapter one, far from being a passive mode of assimilation or absorption, is an active mode of relations to objects, collectives and the world. Consumption, Baudrillard argues, is about the manipulation of signs and what is consumed are relations, system of meanings and difference ("The System of Objects" 24-50). What is crucial in this production of needs for difference or desires for social

[23] Ling gives two conventional examples of sexualised Asian "woman as service" in the Singapore context – the carefully cultivated image of the "Singapore Girl" by Singapore Airlines to appeal to international (white, male) travelers, and the portrayal of the "Sarong Party Girl" by (white, male) expatriates in Singapore (*Postcolonial International Relations* 158-161).

meanings is how the consumption of this manufactured code functions as a good form of social control. Baudrillard states needs are "produced as a *force of consumption*, and as a general potential reserve within the larger framework of productive forces" ("Consumer Society" 45). Hence, production and consumption are two sides of the same coin; they are one and same logical process of productive forces of control (Baudrillard, "Consumer Society" 53).

In this sense, the production and eventual consumption of difference in the form of the "Asian values" ideology provide the ruling elites a cultural relativist position to maintain their dominance that at the same time disguises their culturally specific neo-liberal values and rationality. Neo-liberalism, as discussed before, is a political rationality that is not confined to the economic sphere. Its normative reasoning organises the political sphere, governance practices and citizenship, constructing the state in market terms and producing citizens as rational economic actors in every aspect of life (Brown 693-694). Furthermore, under neo-liberal rationality the citizens' moral autonomy is measured by their ability to provide for their own needs and capacity for "self-care" (Brown 694; Harvey 65). Today, neo-liberalism not only operates and is dependent on information technologies and telecommunications, but also works on an ethics that brings all human actions and domains into relation with the technological economy. In the iN2015 video, the potent mix of neo-liberal values and traditional patriarchal ideals is best represented by Karen and Madam Lee. Here, Karen is depicted as an independent astute teenage consumer of not only conventional beauty products, but also the latest information technologies. Meanwhile, Madam Lee is portrayed as an active, disciplined senior citizen, who is not only a useful caretaker of the home, but also an ideal citizen by taking good care of her health, with the aid of new technologies of course.

The iN2015 video's coding of citizens as rational economic actors with the capacity for "self-care" thus mirrors neo-liberalism's propensity to transfer all responsibility for well being back to individuals that then perpetuates the attribution of personal failures to personal failings rather than to the failings of the system and/or structures (Harvey 76). Simultaneously, the video makes inconspicuous the larger context, where the neo-liberal system has failed miserably to stimulate capital accumulation for all (156). What it has succeeded in doing instead is to restore power to the economic elites, redistribute wealth in favour of those at the core of capitalist production, and suppressed alternative forms of production and consumption (159) or ways of being in the world. Therefore, the iN2015 video, by harnessing identity politics, specifically women as metaphors for development, codes needs and desires that really mirror the needs and desires of the ruling elites.

In her insightful dissection of the middle-class in Singapore, Nirmala PuruShotam, in "Between Compliance and Resistance: Women and the Middle-Class Way of Life in Singapore," elaborates on the role played by women as they seek to reproduce the middle-class way of life for themselves and their families (127-166). This reproduction is at once about the "better" life, access to knowledge and expanding (political) choices, and paradoxically about women's own subordination (PuruShotam "Between Compliance" 127). "Middle-classing" in Singapore, argues PuruShotam, is an on-going, complex, accumulative process that "involves everyday life work to ensure the continued production of upward mobility" ("Between Compliance" 129). According to the author, the production of upward mobility is a complex, interconnected range of betterment, not limited to mobility through material consumption but also a sense of control over one's life. In this intricate range of material and ideational choices, middle-class desires and expectations can take the

form of housing progression (upgrading one's home), progressive technological consumption, employment opportunities, wage increments and alternative voices in parliament ("Between Compliance" 129-131). However, this range of mobility and choices are often performed in accordance with the kind and degree of mobility constructed by the Singapore government in response to what it can deliver the people vis-à-vis its own political interests (PuruShotam, "Between Compliance" 130).

As a result, the middle-class range of mobility and choices, PuruShotam maintains, are negotiated and performed with reference to "shared notions about the limits of the possible," guided morally by Singapore's contradictory brand of "Asian values" and the "fear of falling," that is, the "fear of loosing what has been gained and should continue to be gained" ("Between Compliance" 131-132). The fear of falling, according to PuruShotam, is mirrored in the state's official discourse about Singapore's international standing in the face of globalisation and its corresponding threats of "Westernisation," "welfarism" and political liberalism. This official discourse is used to position middle-class women in a complicit and cyclical relationship with the state and patriarchy, where their needs for empowerment and that of their families are tied to the survival of the patriarchal state. What results is a self-policing situation where "women continuously reproduce a middle-class way of life and society, mirroring the ruling elite's images of that class" (PuruShotam "Between Compliance" 159). Ironically, "Westernisation," "welfarism" and "political liberalism," constructed as "threats," have nothing to do with the survival of Singapore or women, but everything to do with the survival of the ruling elites and the perseverance of their codes.

Today, the survival of the ruling elites and the technological systems they have built are dependent on the production/consumption of information technologies and telecommunications, which is why the promise of control and mobility are now sold to citizens as achievable via the consumption of these technologies. The use of new media technologies and their ability to make visible and invisible contents, as in the case of the iN2015 video, is a clear example of how such technologies abet discourse in potentially shaping subjects into active consumption of their content, while, paradoxically, subjecting consumers under the technologies' digital logic. What this means is that consumption of information technologies and telecommunications ultimately functions as a code of social control *for all* in the nationalist project, even as it is pitched using "difference" as part of its code. Hence, through the iN2015 Masterplan, ensuring consumption of information technologies and telecommunications for all is productive at several contradictory levels.

At one level, the consumption of information technologies and telecommunications is made a measure of the "better" life for the cosmopolitan-middle-classes, in exchange for their restraints on demands for political freedom and individual rights (B.H. Chua, "Consuming Asians" 9; PuruShotam, "Between Compliance" 127-129). At another level, consumption of such technologies is extolled as the means to this "better" life for the rest to aspire to, which then veils the market imperatives and digital logic of participation required of Singapore's technological systems. The next section will look specifically at how the iN2015 Masterplan harnesses material and immaterial means to advocate consumption of information technologies and telecommunications. Through its creation and proliferation of technologised spaces, grounded on the rhetoric of empowerment, control and inclusion, the iN2015 Masterplan paradoxically subordinates all users

under the digital logic of abstraction (general equivalence), control (surveillance) and participation (circulation).

3.3 Consumption and the Digital Logic of Participation: The Paradoxes of Control

The role played by information technologies and telecommunications is fundamental to Singapore's ambition to be a global city. The Singapore government, apart from building and deploying the necessary infrastructures and technologies, has always ensured that its education and training systems are geared towards this ambition and, thus, the needs of its free market economy. The iN2015 Masterplan continues this well-coordinated effort, which today has mutated "from the production of goods to the production of innovation – that is, of new knowledge for the making of goods" or what is known as "perpetual innovation" (Morris-Suzuki 76). As such, the iN2015 steering committee recommends several strategies to encourage the sophisticated and innovative use of the latest technologies, which will, in turn, help develop the "infocomm-savvy workforce" and "globally competitive infocomm manpower" that it needs (IDA, "iN2015 Masterplan" n.p.). Specifically, they have identified two ideal subjects, highlighted in chapter one, to be nurtured for the technological economy or what are the innovative, risk-taking, entrepreneurial technological subjects, able to "tolerate greater ambiguity" (IDA, "Innovation. Integration. Internationalisation" 70).

To deliver these ideal subjects, the government, together with several "key" industry players have come together to fund and/or collaborate on several programmes targeted at developing not only the "existing manpower pool," but "the next generation on which the country's future rest" (IDA, "Drive the Future" n.p.). Together, the government and industry put together an S$120 million investment, which was disbursed through several programmes. The "Infocomm Manpower

Development Roadmap," for example, entails student outreach programmes such as the "Infocomm Clubs" where primary and secondary school as well as junior college students can earn Co-Curricular Activities points by participating in the club's activities, which might include competitions, mentorship and inter-school collaborations.[24] Scholarships are also available for students keen on information communications and new media-related undergraduate courses, both locally or abroad (Sadasivan, "Grooming IT Talent"). In March 2008, another S$70 million was pumped into this roadmap to enhance staff training and upgrading for professionals already in the information and communications sectors (Lam "Innovation, Competitiveness and Government"). Since then, another S$125 million was injected into the sector in face of the 2008 worldwide financial crisis. This was aimed at helping ten thousand information technologies professionals to keep their job and to train, through scholarships, the next generation of professionals. Part of this amount was also meant for the information and communications industry and small and medium-sized enterprises to develop information and communications solutions and stimulate IT adoption (W. Tan "$125m Prop for Infocomm"). Then in June 2009, S$20 million was committed to two programmes, "iTap" and "iLead," that will benefit one thousand IT graduates and professionals over two years. While "iTap" is open to graduate students to upgrade their skills over a broad area of information and communications training; "iLead" targets existing IT professionals to enhance their skills in specialised areas, such as application development, grid computing, green IT, information and communications security as well as wired and wireless networking

[24] In June 2006, there were forty schools with Infocomm Clubs. Within a year of the launch of the iN2015 Masterplan, this number increased to 140 schools, totalling 6,443 members (IDA "Singapore Powers Ahead with iN2015"). Furthermore, there are at least 22 primary schools, 25 secondary schools and 6 junior colleges with media production studios, each costing between S$20,000 and S$200,000 to build and equip (Luo "Media Labs in Schools").

engineering. Beneficiaries of both programmes, in return, will have to serve out a bond with government agencies and companies for a period that commensurate with the training duration (I. Tham "Treat for Infocomm Execs").

To further new technologies adoption in schools, S$620 million is being spent on a standard operating system to link up all schools on a common platform (Luo "Govt to Spend $1.7b"). Of these schools, fifteen to twenty percent of them are being turned into "Experimental Schools" as "test-beds for the innovative use of infocomm in teaching and learning" (IDA, "Empowering Learners" 7). Another S$80 million is being spent on "Schools of the Future," a select five percent of schools that will integrate information technologies and telecommunications for accelerated learning, while experimenting with emergent technologies. Such schools expose students to a broad range of technologies and applications, ranging from interactive white boards to 3-D visualisation technology and interactive computer games (I. Tham "Schools Get Smarter," "When 3-D is Better than 2-D;" Oo "It's All Fun and Games"). Here, apart from the government and private companies, such as Microsoft, Singapore parents too are enthusiastically supporting these modern classrooms by actively enrolling their children in such schools.[25] As highlighted by the iN2015 Education and Learning Sub-committee, these schools act as "beacons of innovative infocomm usage in the education setting, for Singapore and beyond," which also means they "serve as reference sites for major infocomm companies and research institutes interested in creating products in the education and learning space, especially for overseas markets" (IDA, "Empowering Learners" 7, 24).

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[25] Microsoft is not the only company coming in strongly to support the iN2015 Masterplan. In fact, representatives from the major information technologies and telecommunications industries (including gaming) are serving on the iN2015 Masterplan main and sub-committees and/or as focus and/or working group members (IDA, "Innovation. Integration. Internationalisation" 4-6, 125-142).

To ensure that less well-off students are not left behind, the government also initiated the "Neu PC Plus Programme" to help needy families obtain desktop or laptop plus broadband access at subsidised prices.[26] Overall, the iN2015 Masterplan is envisioned to benefit not only businesses and consumers but also the larger population. As highlighted by Dr Lee Boon Yang, then Minister for Information, Communications and the Arts:

> The iN2015 Masterplan is not only about economic competitiveness. We will also be exploring ways to ensure that the elderly, less-privileged and disabled can also enjoy connected and enriched lives for self-improvement and life-long learning. This is to bridge the digital divide and create opportunities for all. ("iN2015: Singapore," n.p.)

On top of the "Neu PC Plus Programme," two other programmes aid this pursuit of a "digitally-inclusive society" – the "Silver Infocomm Initiative" and the "Infocomm Accessibility Centre." The former offers training in digital lifestyle skills to senior citizens so that they can stay "economically active and independent in the digital age." The latter provides a space where people with disabilities are taught information and communications skills to "enhance [their] quality of life and employability, so that they can integrate into mainstream society" (IDA "'Media Factsheets"). While it may seem heartening that such huge amounts of money and effort are being spent on

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[26] Only families with household income of S$2,500 or less are eligible for the programme. A desktop with broadband access will cost them S$285 while a laptop with broadband access will cost S$730. As of June 2009, 27,000 families have benefited from this scheme, with 7,000 PCs sold through the programme (I. Tham "Treat for Infocomm Execs"). Additionally, under the IDA's "Inspire" fund programme, students can have the computers free of charge if they serve six to twelve hours of community service (Supian "IDA Now Bridging the Digital Divide").

education and making Singapore a "digitally-inclusive society," what is worrying is the overwhelmingly economic imperatives, the single-minded direction, the impact on subjectivities and exacerbation of hierarchies such endeavours have in an already highly-competitive Singapore. Such efforts also signify the neo-liberal rationality, highlighted before, that aims to make citizens ultimately active and responsible, through technologies, for their own well-being.

As the ruling elites actively encourage the adoption of these technologies, which is clearly working as schools and corporations jump enthusiastically on the new technology bandwagon, children and adults alike become immensely seduced-compelled to leverage on these technologies.[27] The compulsion to engage and leverage on information technologies and telecommunications works through two divergent yet related digital logics of participation. On the one hand, Baudrillard argues that information technologies and telecommunications do not alienate humans; rather, these "intelligent" machines integrate humans into their circuits, as the popularity of interactive computer games (below) shows. This is because Artificial Intelligence, which underpins these technologies, is devoid of passion and artifice and hence frees users from real intelligence, thought's ambiguity and from their at times difficult relationships to the world and Others (Baudrillard, *The Transparency of Evil* 54-58). This seeming ability of "intelligent" technologies to remove ambiguity, at the same time, is abetted by the rhetoric of control underpinning such technologies. This sense of control is evident in the iN2015 video when Nancy is able to make alternative arrangements, through technology, to pick up David when her meeting unexpectedly ran late or when Mark is able to "foresee" the available parking lots. It

[27] Examples of such enthusiasm, to the point of fetishistic fervour, include schools using wireless handheld devices and/or biometric technology to take student's attendance in the name of efficiency and saving time (Luo "School Attendance Checks Go Digital").

is no coincidence, therefore, that the ideal subjects pressed for by the iN2015 Masterplan, those who are able to "tolerate greater ambiguity" in the larger context of the uncertainties and instability brought by globalisation, are technological ones. However, such rhetorics of control, paradoxically, obscure how the technologies themselves are facilitating globalisation and contributing to its ambiguities, just as the rhetoric of control *of* technologies effaces the fact that it is humans who are controlled *by* technologies.

Intrinsic to the digital logic of participation, therefore and on the other hand, is the logic of control, where through the process of digitalisation, vastly varied phenomena are abstracted and reduced to binary codes. Within this process of digital abstraction is a selection system that forms hierarchies of information (Peterson 135-137) crucial not only for the efficient and fast storage, processing and flow of data, but for complex systems of sorting and control. Since digitalisation enables "monitoring, prioritization and judgement to occur across widening geographical distances and … on a continuous, real-time basis … [it] encourages a tendency towards automation" (Graham and Wood 538). Automated surveillance and information systems in turn "actively facilitate mobility, access, services and life chances for those judged electronically to have the correct credentials and exclude or relationally push away others…and thereby accelerate the trend away from persons toward data subjects" (Graham and Wood 544). In fact, observes David Lyon, everyday surveillance is routine in informational societies where subjects trade privacy for enhanced participation in the digital market place. While this may be empowering for some, Lyon argues that it raises other crucial issues of the discriminatory means, adopted by governments and corporations, of distinguishing and classifying different groups of people, and how far data subjects retain control

over their personal data. He contends, “surveillance as social sorting … suggests that another, perhaps more significant digital divide is created by information rather than having to do with access to information … [instead, it is about] … threats to justice and to equality of opportunity” (“Cyberspace, Surveillance” 77-78). Although this may be true in many instances, I argue that the iN2015 Masterplan’s objective and claim to give *every* individual seamless access to “intelligent” technology is selective, not so much in terms of who the individuals are, but more so with regards to what their technological participation entails.

A case in point is the iN2015 Masterplan’s S$200 million centralised National Electronic Health Records (NEHR) system launched in 2010, allowing patients to have one record throughout their life that can be shared among different doctors and clinics. As the iN2015 Healthcare and Biomedical Sciences Sub-committee points out, integrating patients health record and making them available (with a strong framework to protect patient’s confidentiality) across a range of healthcare providers will ultimately benefit patients as the system allows patients to be monitored remotely, receive consistent and well coordinated care and reduce medical errors in the process. Such a system will also help patients save time and money as “the data travels rather than the patients” (IDA, “Integrating Healthcare” 10). The Sub-committee adds that making personal health records available to patients themselves will empower them to pro-actively manage their health in line with the current shift in healthcare focus from treatment to prevention. But while issues of confidentiality and privacy have been highlighted as areas of concern, it remains possible that patients in future may be discriminated against if or when their health records fall into the wrong corporate hands; and that mistakes may occur in data entry and/or transmission, affecting patients’ records, doctors’ diagnosis and insurance claims. More

importantly, what continues to be unaddressed is how much control patients will have over their health data, particularly in the larger iN2015 Masterplan of integrating information between healthcare, clinical and biomedical sciences, where greater access of healthcare clinical data will be made available for biomedical and pharmaceutical research purposes; a move that feeds the Biopolis project.[28]

The Biopolis, launched in 2003 is an S$500 million purpose-built biomedical research hub where researchers from the public and private sectors are co-located.[29] Catherine Walby, in her analysis of the Biopolis project, argues that to realise the Singapore government's ambition for a thriving biomedical industry, new subjectivities have to be articulated ("Singapore Biopolis"). In particular, she highlights how there is a shift away from the old ideal of the prudential citizen to the cosmopolitan, entrepreneurial global citizen; and for the test subjects, an emphasis on their roles as consumers rather than as donors or research objects. So in order to reach the iN2015 promise of having the capability to take charge and the new freedom to connect, innovate, personalise and create, users must first be subjected to abstraction and relegate control to "intelligent" machines to be actively tracked, electronically tagged and sorted; in other words, to be data subjects in the technological economy.

With the proliferation of digital spaces under the iN2015 Masterplan, the trend away from persons to data subjects is accelerating because subjects have to actively engage and leverage on digital technologies in order not to loose out on services and

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[28] This point about making healthcare clinical data available for biomedical and pharmaceutical research purposes was made by the iN2015 Steering Committee in their discussion on "Strong Clinical and Health Services Research" (IDA, "Innovation. Integration. Internationalisation" 82). Although the Biopolis was not specifically mentioned by the Steering Committee, it is important to situate the Biopolis within the "intelligent nation" vision, as well as in the context of the larger global technological economy.

[29] See JTC "Biopolis" <http://www.jtc.gov.sg/industrycluster/Biomedical/Biopolis/Pages/index.aspx

life chances. Here, subjects have to (whether they like it or not) integrate these technologies into their work and everyday practices, engage in perpetual training to keep pace every step of the way with the demands of the technologies and those of the technological economy, and constantly compete, upgrade, innovate and create. In fact, the iN2015 Masterplan's seeming inclusiveness belies a surreptitious form of exclusion, that is, the inability of social and embodied subjects to *not* partake in its development and related social sorting. Two examples of social sorting come to mind. As Singapore tops an international Facebook usage survey, clocking more time on the programme than most other developed countries (Loh "S'pore Tops Facebook Usage"), it is becoming anecdotally clear that youths here cannot *not* have a Facebook account, especially since projects, school work and socialising are all performed within this digital space. The other example of social sorting is the increasing trend of Singapore employers expecting job seekers, including blue-collar workers, to post their personal data directly into database repositories, making the hiring process easier for the former but not the latter. For despite self-help groups rolling out basic IT classes to help these workers, there will be those who are disadvantaged and/or do not see the relevance of IT skills to the blue-collar jobs they are seeking (Luo "Wiring the Blue-Collar Workers").

In the above cases, ensuring technological access to *everyone* can become a violent enforcement in the consumption of information technologies and telecommunications for some. For a technological economy, widespread access to information is crucial since its consumption generates jobs for the technological class, cost-savings and revenues for software and hardware companies, and ultimately, further production of technologies and their contents. However, these benefits can be at the expense of those who do not wish to participate in digital spaces. The Singapore

government's investments and drive to digitalise the infrastructure and build the workforce necessary for the technological economy is also limiting education not only in terms of choice of sectors, but also in terms of life experiences and different ways of being. What this means is that who or what really gets empowered in the iN2015 Masterplan is not every individual but the technological neo-liberal subjects and economy.

The ruling elites' investments and drive to digitalise Singapore's infrastructure and build the workforce necessary for its technological economic and military systems, come also at the expense of education by limiting it to selected sectors. Specifically, digital media and entertainment, and healthcare and biomedical sciences are two areas identified by the iN2015 Masterplan to contribute to Singapore's technological economy (IDA, "Innovation. Integration. Internationalisation" 8). The focus on the digital media and entertainment industry is in line with the iN2015 vision (which enhances the earlier Media 21 vision) to establish Singapore as a digital media and entertainment capital, offering "innovative content, services and technologies to the world" (65). To this end, the valorisation of technological subjects in the active consumption of information technologies and telecommunications, both symbolically and materially, is crucial. As the iN2015 Steering Committee points out, the three significant spheres needed to shape digital media and entertainment development are not just the development of a pervasive wired and wireless infrastructure, but also the widespread adoption of information technologies and telecommunications, which will in turn bring prices down, and turn consumers into potential producers of digital contents (64-65). To ensure the production of this group of consumers, the Media and Entertainment Sub-Committee recommends targeting children "as early as in kindergarten" since "early exposure to digital media can spark a youngster's interest

and take root" (IDA, "Digital Marketplace" 31). To this end, interactive computer games have been highlighted by IDA for further development.

In the face of interactive computer games growing popularity worldwide, IDA has described gaming as "a serious business" and has been, together with the Media Development Authority (MDA), actively promoting games development through funding, forming alliances of games companies in Singapore and the region, and hosting gaming competitions such as the World Cyber Games (IDA "Game Development," "IDA and GXA"). IDA and MDA's objectives include helping games developers reach gamers faster, promoting the development of cross-platform games so that players can play games both at their desks and even while they are on the go, creating opportunities for Singapore gamers to compete with international and regional players, and turning gamers' passion for the games into careers (Khoong "Powering-Up for Tomorrow;" Y. K. Chan "Games for Work;" Tay "Let the Games Begin!"). To further boost the industry, an S$28 million laboratory called the Interactive Digital Media Lab was set up to explore better gaming technologies (H. H. Chua "$28m Lab").

Additionally, another S$1 billion have been set aside for the industry (including to build the ultra-fast broadband network) on top of the S$200 million that has already been pumped into the media industry since 2003 (Chng "The Game is On"). The iN2015 Masterplan's "Connected Games" programme is thus an aspect and a culmination of these efforts to turn Singapore into a hub for trading and distributing digital media and entertainment products. Since games are digital commodities, the "Connected Games" programme will provide an "always-on" platform for developing, managing and distributing games, content, and related services, bypassing the need for physical trade events. IDA claims that through this infrastructure, game

creators can have “a new avenue to monetise their intellectual property” and gamers will have a wireless, networked environment for “more engaged and pervasive” game-play (IDA, “IDA Invites Proposals” n.p.).

For Kline, Dyer-Whitheford and De Peuter, the interactive computer game is an ideal type of commodity for the technological economy. As a product of computer technologies, its production typifies the youthful and innovative labour that is archetypal of the information society. It also embodies the qualities quintessential to the technological economy, which are simulation, and its role as an experiential good subjected to intense advertising, promotional and surveillance strategies. Moreover, interactive computer game is characterised by the need for constant creativity to incite perpetual desires as a way to build new audiences. However, Kline, Dyer-Whitheford and De Peuter also point out that despite gaming being marketed as a “fun,” “cool” and “empowering” activity due to its interactive nature and rhetoric of play (and passion), game development is actually strongly “shaped, contained, controlled, and channeled within the long-standing logic of commercial marketplace dedicated to the profit-maximizing sale of cultural and technological commodities” (*Digital Play* 21). So not only is the game development process mundane, relentless and even brutal, but by making work more like play (and hinging on gamers’ passion for the games), employers are able to cover up any exploitative work conditions. Furthermore, such rhetoric also makes invisible the free volunteer labour that is very much a part of the gaming industry. What this means is that the “Connected Games” wireless networked environment, paradoxically, also facilitates the potential exploitation of consumers as “unpaid creators, test subjects, expert informants, and volunteer labour” indispensable to an entertainment industry adept at its “representation of work as play…[and] conversion of play into work” (Kline et al. 201-202).

Gaming and digital technologies in general, nevertheless, remain seductive for many, due, in no small part, to their digital logic of participation highlighted above. But under the digital logic of participation, subjects are really relating to himself or herself engaging with virtuality and the programme rather than with an Other. What this also means, paradoxically, is that the logic of participation disguises the fact that consumers have to work and/or play within someone else's framework, model and/or code. In other words, although desires are "positively" produced through the logic of the technologies, what the rhetoric promises – freedom, control and empowerment – remains always deferred. To further game development beyond the entertainment arena, there are plans by the Singapore government to fund and extend interactive games as teaching tools (W. Tan "Boost for Video Games as Teaching Tools"). Due to the interactive computer game's amazing ability to simulate and create immersive environments, the use of games as training tools has long been a part of the military and the healthcare and biomedical sciences industry. In fact, the current "repurposing" of entertainment research and development, especially for national defence, brings interactive computer games full circle to its roots since most of the technology used in computer games now had its origin in military research (Hertz 204-205).

Even though the military may continue to fund research today, tapping into and modifying commercial off-the-shelf games for military purposes have become equally important. The benefits of this practice, as highlighted by the Singapore military, are three-fold. Firstly, it is a cheaper and more convenient alternative to engaging professional game developers for customised game contents under strict licensing rules. Secondly, it is a "cost-effective conduit to motivate and engage a game-savvy generation of soldiers in repetitive tactical thinking 'anytime, anywhere'"

(Fong, "Adapting" n.p.). Lastly, it is a potent recruitment tool to "lure a younger generation hooked on the gaming subculture into a career" in the military (DSTA, "DSTA in the News" n.p.). The iN2015 Masterplan's aim of developing the digital media and entertainment industry and "empower" an emerging breed of gamers, therefore, is also empowering for the military. In fact, as the military readies itself for network-centric warfare, playing computer games has become "a moral obligation ... in the interest of national security" (Hertz 198) and consumption of information technologies and telecommunications transformed into the "citizen's duty" (Baudrillard, "Consumer Society" 51).[30]

In the field of healthcare and biomedical sciences, games involving simulations are also envisioned to benefit, for example, Singapore nurses by providing them with a platform to "analyse situations, develop priorities and think critically" before entering the clinical setting (W. Tan "Boost for Video Games as Teaching Tools"). Perhaps, the most infamous use of simulation in the global life and biomedical sciences is the Visible Human Project (VHP). A US National Library of Medicine project initiated in 1989, the VHP involves a pair of corpses that were frozen, systematically sliced, imaged, converted into computer data files, then reconstituted and animated to form two virtual bodies intended for clinical and biomedical research.[31] Recognising the repository's immense value to clinical and

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[30] I develop further in chapter five the mutually constitutive relationship between the iN2015 Masterplan and the Third Generation Singapore Armed Forces (3G SAF).

[31] The male corpse of the VHP was a prisoner, named Joseph Paul Jernigan, on death row and made to "redeem" himself through this project. The female corpse was an unnamed 59-year-old woman whose husband donated her body to the project after her death from a heart attack. For an analysis on the gendered implications of the VHP project, and the paradox of medical imaging, see Lisa Cartwright "The Visible Man: the Male Criminal Subject as Biomedical Norm" (123-138), and "A Cultural Anatomy of the Visible Human Project" (21-43). The VHP project has since enabled a wide range of educational, diagnostic, treatment planning, virtual reality, artistic, and industrial applications. See

biomedical research, the School of Biological Science at the Nanyang Technological University (NTU) obtained the rights for an official VHP mirror to be based in Singapore. This they hope will make the VHP mirror at the university a "major biomedical digital image resource" for the "growing number of educational, institutional, research and industrial establishments in Singapore and the region."[32]

Catherine Walby in her book *The Visible Human Project* insightfully connects the constitutive moments of the life and biomedical sciences to the corpse. Indeed, the use and study of corpses have been foundational to modern western science but what interests Walby is the irony of the situation. Particularly, how the promise of life (immortality) by biomedical technologies is paradoxically premised on death, and how this is at the same time made invisible by both the digital characteristics of and the discourse surrounding the technologies. While life and biomedical sciences purport to be about understanding life with the promise of deferring death, its technologies actually operate in an inverse logic – they freeze, objectify, render and kill. Walby argues, the alteration of the human body into digital data through biomedical technologies create mechanical and limited modes of understanding corporeality, which in turn has profound consequences for understanding life and death. Implicit to Walby's analysis of the VHP is the idea of reversibility, where notions of life are supplanted by digital technologies that produce deathly views of the body that, in turn, mechanises worldviews and ideas of life in a generalised cycle.

<http://www.nlm.nih.gov/research/visible/visible_human.html>. Personally, I have also used the VHP data for my interactive artwork, entitled *Virtual Bodies in Reality*, to comment on the changing nature of violence in digital space. See <http://web.mac.com/margetan/iWeb/Site/VBR.html>.

[32] See "Sun Microsystems Provides High Availability Platform for Vanguard Biomedical Database" <http://sysdoc.doors.ch/SUN/nanyangtech.pdf>.

Although Walby's observation about abstraction is somewhat similar to Baudrillard's, for the latter, the implosion of meaning in digital space is not so much about the digital replacing the "real." Rather, it is about how their boundaries have become so blurred that it is no longer possible to tell the digital apart from the "real" since they have both become equally "true." In his theory of simulacra, Baudrillard postulates that as societies move toward a world of simulation, reality gives way to the hyperreal. Here, signs do not refer back to their referents and are, in fact, taken as the real. The logic of simulation, hence, no longer deals with facts and/or reason; rather, it is based on models and/or codes (which are already implicated in particular perspective) that then allows for different and even contradictory interpretations. As Baudrillard elaborates:

> Simulation is characterized by a *precession of the model*, of all the models based on the merest fact – the models come first, their circulation, orbital like that of a bomb, constitutes the genuine magnetic field of the event. The facts no longer have a specific trajectory, they are born at the intersection of the models, a single fact can be engendered by all the models at once. This anticipation, this precession, this short circuit, this confusion of the fact with its model … is what allows each time for all possible interpretations, even the most contradictory – all true, in the sense that their truth is to be exchanged, in the image of the models from which they derive, in a generalized cycle. (*Simulacra* 16-17)

Furthermore, tied to the logic of simulation is the logic of circulation. Baudrillard points out that in informational spaces, the value of the message is not its content but its circulation, since for content to be conveyed well and quickly through the networks it has to be as transparent and insignificant as possible. As a result, desires, knowledge, actions, beliefs and pleasures have become less important in themselves than how they are "produced, induced, solicited, media-ized or technicized" (Baudrillard, *The Transparency of Evil* 46). Therefore, the success of Singapore's healthcare and biomedical sciences, as with the digital media and entertainment industry, depends on the active participation of the population in such enterprises, which convert individual and masses equally to data subjects crucial for the current digital form of production intrinsic to mutated capitalism. Under mutated capitalism's digital logic of abstraction (general equivalence), control and participation (circulation), constituting humans as data subjects not only facilitates the integration and access of such data across different institutions and informational economies, but also fundamentally impact our understanding corporeality, life and death. Singapore, through the iN2015 Masterplan, is hence an excellent example of mutated capitalism, highlighted in chapter one, where social control is diffused, motivated, defined by market and military imperatives, and underpinned by consumption and the digital logic of participation, control and their feedback loops.

3.4 The Transparency of Discourse and the Transparency of Technology: Deciphering Form from Content

Returning to Walby's analysis of the Visible Human Project, what interests her are also the grounding gestures that enable the project in the first place. Drawing from critical theory, grounding gestures here refer to acts that construct our understanding of the world and yet remain outside of or invisible to the world they organise and explain (Tyson 2006). Walby highlights the Genesis rhetoric deployed in the VHP project (VHP figures as digital versions of Adam and Eve) that seeks to justify the project in a narrative of Origin and Being, while the realistic visualisation and animation of dead corpses as biomedical models ground the project's authority for understanding corporeality and life. These grounding gestures – the discourse around origin of life and the particularity of digital technologies to reanimate the dead – disguise the fact that the life and biomedical sciences' promise of warding off mortality are constructed upon the same technologies that are implicated in threats of cruelty, violence and death.

In a similar ironic vein, the Singapore enterprise, via the iN2015 Masterplan, secures public legitimacy for its projects through a series of grounding gestures, both symbolic and material, which then create a cycle of consumption of information technologies and telecommunications that they require. Firstly, through myths of the need for and benefits of capitalist development, and the deployment of the "Asian values" ideology, subjects are constructed, moralised and naturalised into normative relationships with the global restructuring process and its technologies. Additionally, through the rhetoric of empowerment, control and inclusion, the particularity of digital technology to inconspicuously monitor, search and sort are made invisible. Consumption of information technologies and telecommunications are actively

created for all that then belies the fact that interactions in digitalised spaces are precisely based on a complex system of control and exclusion, and that the survival of the technological systems are exactly based on a productive citizenry that actively consume these technologies.

Apart from discourse, nevertheless, the enticement to become active technological subjects is further enhanced by the capability of new media technologies to digitally and invisibly abstract contents and to draw humans into its circuit through its digital logic of participation. Paul Virilio, in *The Aesthetics of Disappearance*, highlights how chronophotographic technologies are about the production of appearances and working through the aesthetics of disappearance, these technologies construct appearances and shape consciousness, which are indispensable to the war (and peace) machine for dissuasions, pacifications and for collective conformity (36-45). The gathering of ideas and "visions of a colourful infocomm future for Singapore" from schools and the public not only provides legitimacy to the iN2015 Masterplan, but by integrating these ideas with the ruling elites' vision in the idealised form of the iN2015 video, any differing and negative views can be effectively censored and erased. At the same time, the idealised image of the iN2015 video obscures the painful global restructuring process and the logic of pervasive computing to inconspicuously monitor, search, sort, and dissimulate Others. Furthermore, through the digital logic of participation, where users forget that they are really relating to himself or herself engaging with virtuality or someone else's codes, which means that the promise of empowerment and control through technological consumption remains always deferred, a deferment that is precisely what is needed for the continuous consumption of pervasive computing needed for future waves of national IT plans. This note, or promise of more to come, is most

visible at the end of the iN2015 video when David ponders what else will be invented in the next ten years from the supposed year 2015.

In an interesting move by IDA, the iN2015 video *Imagine Your World iN2015* was removed from its prominent location on the iN2015 Masterplan website during its revamp in late June 2010. In addition, the website's rhetoric of giving every individual "seamless access to intelligent technology – and with it – the capability to take charge" and the "new freedom to connect, innovate, personalise and create" was archived to digital history. Although another video *iN2015: Our Journey Thus Far* has taken the spot of the iN2015 video, this new video is much less absorbing as it appears closer to the many other corporate videos out there. What is compelling in the iN2015 website revamp, nevertheless, is the Flash animation created out of new images and select stills from the iN2015 video, which one mouses-over to see different timelines and accompanying text descriptions.[33] This Flash animation version of the iN2015 video is called *Experience iN2015* and features only two of the original characters in the video, namely, David the student, and Nancy the entrepreneur. Tobey, the expatriate is replaced by a more mature-looking man, just as his avatar is now a young Asian male in shirt and tie. Significant changes to the storyline include David now taking the school bus to the zoo and public bus home. Tobey now has a wife who works in Singapore as well, and children who attend the local school.

[33] All three versions of video and animation are available on IDA website ("iN2015 Masterplan").

On the surface, this change in content can be attributed to the negative online comments generated by the public when the iN2015 video was posted on YouTube.[34] I argue, however, that the changes in content of the iN2015 website and video (through the Flash animation), in fact, point to the potential of digital technologies to further manage and control the populace through its logic of interactivity, which paradoxically gives the users a higher sense of control. David Rodowick, in *The Virtual Life of Film*, points out that films and videos are not simply moving images, but provide a condition of viewing or desire for a specific kind of sight (54). In other words, the medium of film or video also encompasses techniques. In the case of the interactive screen, Rodowick observes, it encourages a new kind of sociality, new relations to space and time, and expectations of interactivity and control (174). What results is a desire to control time, not in the sense of preservation, but in the management of it (Rodowick 138-141). Crucially, with new media, existing spatial and textual media are transcoded into digital forms that then allows them to be manipulable and communicable through information networks. But in this transcoding from the analogue to the digital, the nature of representation changes because beneath the present image is no image at all, but information and electronic signals (Rodowick 125). In this sense, as interactivity increases because of the Flash

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[34] These uploaded copies are essentially the same, although the earliest (first on the list) to be uploaded has the most viewers (18, 821) and comments (71), which were mostly critical, although some viewers liked what they saw. The criticisms ranged from the video being "racially biased" to it being a representation of the rich. With regards to the technologies, the general consensus was that the technologies depicted were too "farfetched." There were two comments about the safety of such technologies and two other reservations about digitalised communication and interconnectivity. See <http://www.youtube.com/watch?v=ibCL4rmAWGA&feature=related>, <http://www.youtube.com/watch?v=hCdSrvnzHAc> and <http://www.youtube.com/watch?v=-jfVw_BunC0>.

programme, the control of the images increases as well, ironically making one see less than what was there before. In the incorporation of the audience feedback (if that was really the case), the changes to the representation of the iN2015 Masterplan hide the fact that the national technology policy remains unchanged and is proceeding as usual. This brings me back to the point made by Baudrillard, highlighted in the epigraph, about the intelligence of the form to hide itself in its content. So, in this case, the changes embodied in the Flash animation *Experience iN2015* should not be confused with a change in the structure of the iN2015 Masterplan.

3.5 Connecting Local Discourse to Past, Present and Future Discourses

This chapter explored the conditions of possibility for the iN2015 Masterplan. Through its discourse, the techniques and technicity of its technologies to selectively make visible and invisible content, the iN2015 Masterplan sets out to shape consciousness and subjectivities into receiving its contents. In other words, through the political economy of the subject and the digital logic of participation and control, normative relationships with pervasive computing and the larger global restructuring process are encouraged and sustained. However, such coding of needs and desires, which is in turn productive of future waves of developments, is not limited to the iN2015 Masterplan. Rather, it draws from a tradition of technological discourses that seek to present pristine and novel images of technologies as they manifest in the everyday life of people.

The next chapter looks at the discourses surrounding the research and development of pervasive computing, via the visions articulated by Mark Weiser, whom many consider the “father” of “invisible” computing. I highlight how the striking similarities between Weiser’s scenario, painted in his 1991 seminal article

"The Computer for the 21st Century," and that of the iN2015 video, even though they are almost two decades apart, are far from a simple coincidence. These similarities are products of the academic tradition of citation and the convention of harnessing the politics of everyday life to socially construct, reinforce and normalise idealised views of technologies. At the same time, this chapter demonstrates how, through selective "blindness," Weiser's discourse and those of his opponents are equally productive of future waves of research and development. In particular, despite Genevieve Bell and Paul Dourish's efforts to situate ubiquitous computing in the present, in order to take account of the "messiness" of the technology and everyday life, their discourse repeats Weiser's productive move, albeit through culturally essentialist views, grounded on "difference" or "alternative" views/use of the technologies. In this instance, even as both sets of discourses are products of their time, mainstream views of ubiquitous computing (embodied in Weiser's vision in the context of America) and alternative views of the same technology (exemplified by Bell and Dourish's account of ubiquitous computing in Korea and Singapore) form two sides of the same academic-technological-development coin, equally productive of future ubiquitous computing development.

Chapter Four:

Blinding Cultures: "Everyday Life" in Ubiquitous Computing Research and Development

> "The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it" (Mark Weiser, "The Computer for the 21st Century" 66).

> "The smallest of everyday objects underscores a myth of the absolute functionality of a completely technological world, beyond social contradictions and history" (Jean Baudrillard, "Technics as Social Practice" 58)

> "Each and every invention of a technical object has also been the innovation of a particular accident. From the sum total of the technosciences does arise, and will arise a 'generalized accident'" (Paul Virilio, *Virilio Live: Selected Interviews* 16).

4.1 "Invisible" Technologies in the Research and Development of Ubiquitous Computing

Chapters two and three have shown how crucial utopian visions of technologies are ensuring active consumption of information technologies and telecommunications needed by the technological economy and military. This chapter goes back historically to situate the discourse around pervasive computing to highlight how the

vision provided by the iN2015 Masterplan did not develop out of a vacuum, but is part of a larger network of things, situations, choices and discourses. In particular, I look at the discourses surrounding the research and development of ubiquitous computing, and point to how these discourses ground themselves on the politics of "everyday life." By connecting to the familiar, while simultaneously and paradoxically standing apart from the everyday and/or by evading the historical and social contradictions that underpin today's information technologies and telecommunications, these discourses ensure the continuous research and development of ubiquitous computing In addition, I argue that their selective "blindness" to the neo-liberal values and C^4ISTAR techniques and technicity underpinning the technology is not only productive of further technological development, but also indicative of how the logic of the technology is shaping the very thoughts and discourses surrounding ubiquitous computing research and development.

This chapter has two main sections. In the first section, I look at the visions articulated by Mark Weiser, whom many consider the "father" of ubiquitous computing. I argue that Weiser creates a seamless and empowering vision of ubiquitous computing through the language of the familiar and technological continuity, which simultaneously and paradoxically entails a discontinuity with the historical values, social contradictions, and techniques and technicity inherent to the technology. Specifically, I highlight the historical mix of techniques from liberal trade, scientific developments, underpinned by Enlightenment notions of progress, and military thoughts and strategies that structure Weiser's discourse and prototypes, as well as his disavowal of Artificial Intelligence and Virtual Reality – the two technologies fundamental to ubiquitous computing. Drawing on Baudrillard's

"Technics as Social Practice," I point to Weiser's selective "blindness" as a form of social manipulation that obscures the neo-liberal values and C^4ISTAR techniques and technicity underpinning ubiquitous computing. At the same time, using Don Ihde's "A Phenomenology of Technics," I suggest that his desire for technologies to disappear deny that these technologies play the role they do in the human-technology continuum of relations. Both his "blindness" and disavowal then work to ensure ubiquitous computing's continuous research and development.

Following Genevieve Bell and Paul Dourish's critique of Weiser's vision in "Yesterday's Tomorrow: Notes on Ubiquitous Computing's Dominant Vision" (133-143), I extend their point on how the academic practice of citation perpetuates the "proximate future" tone of Weiser's discourse not only absolving the technologists from responsibilities, but also providing the grounding gestures for further ubiquitous computing development. Nevertheless, in the second section of this chapter, I argue that Bell and Dourish's attempts to account for ubiquitous computing in the present and messiness of "everyday life" in Singapore and Korea, reflect the contemporary culture of producing "difference" and/or "alternative" views and use of the technologies, which are themselves then productive of future waves of research and development. Here, I demonstrate how Bell and Dourish's discourse in fact mirrors that of Weiser's, one grounded on technology's seamless applications in the future of "everyday life," the other on its present, messy and everyday social and cultural appropriations. Furthermore, both discourses achieve their objectives through selective "blindness" to their conditions of possibility, especially the continued role of the military and the current neo-liberal industries in sustaining and shaping the research and development of ubiquitous computing. I conclude that Weiser's mainstream views of ubiquitous computing and Bell and Dourish's "alternative"

views of the same technology form two sides of the same technological-development-coin and are equally productive of ensuring the continued research and development of ubiquitous computing.

4.2 Look to the Past, Ignore the Future: Military and Neo-Liberal Techniques and Technicity in Ubiquitous Computing Research and Development

Mark Weiser, in his 1991 seminal article "The Computer for the 21st Century," sealed the close connection between pervasive computing and "everyday life" by articulating the idea of weaving information technologies and telecommunications into an integral and "invisible" part of everyday life (66-75). For Weiser, the most profound technologies were those that disappeared and became indistinguishable from the fabric of everyday life. Pointing to writing as "the first information technology," he argued that the ability to transform spoken languages into symbolic representations and store them for the long term, freed information from the limits of individual memory (66). But what was crucial for Weiser was how writing was not only ubiquitous and necessary for modern life, but also the media which it sat on (from books, magazines, newspapers to street and shop signs, billboards, graffiti and candy wrappers) did not require active attention; rather they allowed the information they carried to be conveyed and used instantly. Therefore, Weiser saw the "real potential of information technology" as being able to take into account the human environment and "vanish into the background" (66).

Unhappy with personal computing that made huge demands on users' focus, Weiser and his colleagues at Xerox Palo Alto Research Center (PARC) instead proposed and built "tabs" (inch-scale machines like Post-It notes), "pads" (foot-scale machines like sheets of paper) and "boards" (yard-scale machines like blackboards or

bulletin boards) that could be distributed in the environment and yet remain interconnected to each other (70). Weiser stressed that these machines could be programmed with minimal or no Artificial Intelligence to sense and track people's movements and allow access to spaces accordingly, display information, be interactive with or without inputs from humans, and "animate objects previously inert" (72). Weiser maintained that through location, scale and network such miniaturised information technology could be distributed and embedded into daily environments to provide its users with "embodied virtuality" – "the process of drawing computers out of their electronic shells" where data processing, analysis and alteration occur in the "physical world" (70). He made a distinction between "embodied virtuality" and Virtual Reality. According to him, Virtual Reality creates a world inside the computer whereas "embodied virtuality" does not seek to simulate or replace the world; it aims instead to "invisibly enhance the world that already exists" (Weiser, "The Computer" 66).

Weiser likened the disappearance of technologies to the "vanishing electric motors" at the turn of the century (70). He highlighted how from the typical workshop or factory that contains a single machine controlling hundreds of different machines (through a system of shafts and pulleys), each with its own motive force, to the automobile with dozens of motors and solenoids, these smaller machines work without each of them needing special attention. The "invisibility" of technologies, Weiser clarified, is both "in fact as well as in metaphor" (70). He continued to point out how computers today are already embedded into light switches, thermostats, stereos and ovens in an increasingly interconnected and ubiquitous network, similar to the electricity that coursed through the walls, which people used unconsciously to accomplish everyday tasks. At the same time, this disappearance of technology was

"a fundamental consequence not of technology but of human psychology," since "whenever people learn something sufficiently well, they cease to be aware of it" (66). Consequently, Weiser claimed that by relegating computers to the background, ubiquitous computing made users less aware of the machines and more aware of the people around them and on the other ends of their computer links; its "transparent connections" across space and time "tend to bring communities closer together" (75).

To give a sense of what it would be like to live in such a world of "invisible" technology, Weiser painted a picture of a typical workday in the life of Sal, a mother and designer (74-75). Sal wakes up to the smell of freshly brewed coffee, an order taken by her alarm clock when it sensed her stirring. As she looks out her window into her neighbourhood, apart from the view, she sees "electronic trails" of time markers left by her neighbours as they come and go during the morning, making her feel connected and reassured in her neighbourhood. Similarly, looking at her children's windows, she can tell that they have been up for fifteen and twenty minutes and are now in the kitchen. At breakfast, Sal chooses to read the conventional newspaper but as a quote in the business section caught her eye, she scans it together with the name, date, and section and page number of the newspaper with a special pen, which then sends a message to the paper to send the quote to her office. Meanwhile, she receives an email from the makers of her garage door opener, not only to notify her of the new manual she requested that is on its way to her, but also how to locate her lost manual by activating the self-tracking device on the manual through entering a code in the garage door opener.

On her way to work, Sal checks the traffic condition ahead of her on her foreview mirror and the food shops along the way. She decides to stop for coffee at a new shop to avoid the traffic jam. Once Sal arrives at her office, her foreview mirror

locates for her the nearest available parking lot and as she walks toward her office, the machines in the building get ready to log her in, completing the sequence the moment she enters the office. Later, Sal holds a virtual meeting with her colleague Joe in a virtual office pre-programmed by the two of them to give each other access to their respective physical location and screen contents of folders and the folders' location. Sal and Joe go on to verbally discuss and share particular documents through the "liveboard" before the latter reminds the former to get in touch with Mary Hausdorf. Sal cannot recall Mary and searches through past meeting records before coming across Mary's name and biographical information. Sal is thankful that Mary has left her biographical information on even though their meeting ended a week ago and proceeds to send the latter a note. Although Weiser ended his article with a quick mention of privacy and misuse of information concerns within the above scenario, he quickly suggested that cryptographic techniques can easily overcome such issues. In fact, Weiser argued, ubiquitous computing, by making itself readily accessible to all groups, may diminish computer addiction in the process, just as hacking on crystal sets for radio signals declined when radio became pervasive. Finally, Weiser concluded that the technology's ability to make "everything faster and easier to do" helps to overcome the problem of information overload and, as the technology fits into the human environment, rather than the other way around, using computers becomes "as refreshing as taking a walk in the woods" (75).

It is remarkable how fundamentally similar the scenario painted by Weiser's rhetoric and the iN2015 video are, even though they are almost two decades apart and originate in different countries. Firstly, both visions made women/mothers central to their rhetoric, which I have shown in the previous chapters is a productive way of harnessing the political economy of the subject to actively participate in the

production and consumption of information technologies and telecommunications. Secondly, and related to the first point, both imaginations are highly optimistic and similarly frame pervasive computing as positively transformative, efficient, seamless and empowering through the control it affords users. This sense of control and ability to overcome ambiguities is present in Weiser's scenario when Sal is able to check the traffic condition in advance and avoid the traffic jam ahead of her while on her way to work, a scene repeated in the iN2015 video when Mark "foresees" the available parking spaces. Lastly, both scenarios are based on the "mundane" activities of everyday life mediated every step of the way by invisible technologies. Yet, these fundamentally similar visions are not simply a coincidence but a result of the globalisation of the computing industry and the common thread of vision within.[35] For this section, I focus on how Weiser's vision and rhetoric ensure ubiquitous computing's continuous development by grounding itself on the politics of "everyday life," which entails a series of binaries and selective "blindness" to the historical values, social contradictions and conditions underpinning ubiquitous computing.

The grounding of ubiquitous computing discourse on the "mundane" activities of everyday life works by settling any upheavals that may arise with the introduction of new technologies, through the language of the familiar. So while Weiser positions ubiquitous computing as something new (for the future), his rhetoric creates normative relationships with ubiquitous computing by linking it to the old – on the one hand, through his idealised image of the technology as it permeates familiar

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[35] See for example the "Knowledge Navigator," a concept described by former Apple Computer CEO John Sculley in 1987 and the video produced to show how software agents assist a Professor in his search for information <http://www.youtube.com/watch?v=8mLqJNDWx-8>.

everyday life activities and, on the other hand, through his attempts at establishing technological continuity. In other words, he presents ubiquitous computing not only as efficient and empowering in its (future) everyday applications, but also as part of a "natural progression" from older technologies capable of seamlessly linking the mechanical and electric with the electronic. In his scenario highlighted above, this seamless connection between the mechanical and electric with the electronic appears most strongly in two particular scenes. Firstly, it shows when Sal uses a special pen to scan a conventional newspaper in order to get a quote sent electronically to her office; and secondly, when she receives an email about her lost garage door manual and how to activate its self-tracking device by entering a code in her garage door opener.

Additionally, throughout his article, Weiser connects ubiquitous computing with writing technology, equates traditional writing media with new media, likens the "disappearance" of the technology to electricity and the "vanishing electric motors" at the turn of the century, and compares using ubiquitous computers to "taking a walk in the woods." These conflations work to create normative relationships with ubiquitous computing by highlighting what is already familiar and/or "natural," while simultaneously avoiding the historical and social contradictions that are specific to the technology. Information technologies and telecommunications, unlike books, magazines, newspapers, street/shop signs, billboards, graffiti, electricity and electric motors, have very different techniques and technicity. Information technologies and telecommunications function specifically on the digital logic of abstraction (general equivalence), control, acceleration and their corresponding logic of simulation, participation (interactivity), circulation and disappearance (highlighted in the previous chapters). These are logic produced by and imbued with very specific history and values, namely, liberal trade mixed with scientific development, underpinned by

Enlightenment notions of progress, the measurability and perfectibility of society, as well as military thoughts and strategies.

A closer look at the "mundane" everyday activities represented in Weiser's scenario shows that they are invariably work related, which also explains the fundamental similarity between Weiser's vision and the iN2015 video. This emphasis on work as a social and institutional frame is not new and points to how information technologies and telecommunications are not neutral but articulate certain values and priorities. Armand Mattelart, in *The Invention of Communication*, highlights that the modern concept of communication that structures today's information society draws from seventeenth and eighteenth century western social projects, which entail a complex mix of ideas about liberal trade, scientific progress, measurability and the perfectibility of human society (*xv*). Establishing trade and communication routes then were argued as not only necessary for the circulation of commodities, but also to bring about "rational" and "good" nature as well as to "correct any inequalities" through the distribution of goods (Mattelart, *The Invention of Communication* 7-11). The advocacy for the free circulation of goods and labour also produced the appeal for a universal language – a language of "geometrical certitude" – that can pass unchanged and transparently from scientific into the vernacular and thus general use (Mattelart, *The Invention of Communication* 44). Furthermore, under the Enlightenment ideals of progress and perfectibility, movement (of goods and labour) became a virtue and later associated with notions of freedom and emancipation (Mattelart, *The Invention of Communication xv*, 16), while "laziness" made a vice (Mattelart 283), and people looked to engineering and science as the answer to this "better," "happier" and "gentler" life (Mattelart, *The Invention of Communication* 15-16).

The rise of the technically trained elites and the alliance between manufacturers and positivist scientists, Mattelart continues, eventually led to new ways of managing societies as large industries and the "government of men" moved towards the "administration of things" (Mattelart, *The Information Society* 28). By 1911, the perfectibility of society became the perfectibility of labour when Federick Winslow Taylor introduced the *Principles of Scientific Management*, a study that resulted from tracking and tabulating the movements and gestures of factory workers according to a time-scale, which stressed standardisation and the intensive division of labour for efficient and fast production. The proponents of the free-market political economy consequently latched on to these techniques to structure not only production but also consumption. Scientific management hence moved beyond the factories to regulate the planning and administration of everyday life, which today is advanced, automated and refined by information technologies and telecommunications (Mattelart, *The Information Society* 37-40; Robins and Webster 96-109).

Historically, the desire for measurability and perfectibility is also inseparable from military thoughts, strategies, and its desire for certainty and control. Hence, Mattelart points out, the belief in scientific progress, far from being entirely based on egalitarian ideals, also encompasses the era of Empire (*The Invention of Communication xv*), contradictions, embargos (*The Information Society* 22-23) and revolutionary changes in military strategies. The notion of "network," for example, taken from the lace-making industry to designate the warp of fabric, moved into scientific vocabulary to describe the "reticulated matter of the skin," and subsequently inspired Sèbastien Le Prestre de Vauban, the fortification engineer of Louis XIV, to physically shape the territory of France in a reticular fashion for defence and offensive operations. In 1802, Pierre-Alexandre Allent, an officer in the engineering

corps and Vauban's biographer, used the term "network" in his essay on military reconnaissance (*The Information Society* 14-17). The connections between the development of (road, rail, telegraphic) networks and the speed and movement of troops, in fact, concerned Europe's military during the eighteenth and early nineteenth century – a period that established the military practice of decentralisation under a single command or the consolidation of the centre with the support of the periphery. This is a decentralisation achieved through the strategic mobilisation of civilian population, through conscription and for the supply of logistics, in the preparation of war or what is later called "Total War" (Mattelart, *The Invention of Communication* 198-203; Van Creveld 90-115).

Urban planning and the origins of cities, therefore, Paul Virilio points out, is as much the product of (the preparation of) war as of mercantilism (Virilio and Lotringer 19). The merger between war and mercantilism, in the form of the wartime economy, inaugurated the military-industrial-complex and perverted the notion of "civilian," as civil and military spaces blurred in the total involvement of the economy in war (Virilio and Lotringer 24-25). Hence the most crucial effects of the military on the civilian world, argues Manuel DeLanda in "Economics, Computers and the War Machine," occur not during times of war but paradoxically during peacetime, in its slow and subtle militarisation of civilian society inaugurated by the strategy of "Total War" (164-172). DeLanda, for example, points to standardisation and routinisation, which underpin Taylor's *Principles of Scientific Management*, as military techniques developed by the French armouries in the late eighteenth century and the Dutch armies in the sixteenth century, to create weapons with interchangeable parts and train soldiers by streamlining their movements for greater efficiency and central command and control, respectively (165-166). DeLanda thus maintains that in

the transfer of military objects to the civilian world, what is crucial in that transfer is the production processes behind the object, such as “the entire control and command structure of the military” behind the computer (168).

The military control and command structure is present in Weiser’s discourse in his equating the disappearance of technology with the single machine controlling hundreds of different machines, each working independently without needing special attention. In fact, Weiser later develops this framework of centre and periphery in his model of calm computing, when he co-wrote “The Coming Age of Calm Technology” (75-85) with John Seely Brown in1996. In this article, Weiser and Brown argue that since ubiquitous computing has become a “fundamental trend” (78), and as it is characterised by a distributed network of “lots of computers sharing each of us” (77), there is a need for a new approach to ubiquitous computing design to focus on “calmness” (79). Calm technology, according to them, engages both the centre and periphery of human’s attention and moves back and forth between the two. The periphery informs without needing explicit attention from users, yet it is “anything but on the fringe or unimportant” and can move to the centre when necessary (Weiser and Brown 79). Hence, the movement back and forth between the centre and periphery is “encalming,” the authors claim, because the periphery informs without over-burdening the users and enhances their control by its ability to re-centre (Weiser and Brown 80).

Additionally, Weiser and Brown contend that by empowering the periphery, the technology can “enhance our *peripheral reach* by bringing more details into the periphery … [which] increases our knowledge and thus our ability to act, without increasing information overload” (80). Calm technology, the authors maintain, puts us “at home, in a familiar place,” engages “our preattentive periphery so we are never

surprised" and "connects us effortlessly to a myriad of familiar details" (Weiser and Brown 81). They claim that "locatedness" or the "connection to the world" is the "fundamental gift" of the periphery (Weiser and Brown 81). They conclude that although it seems counter-intuitive to argue that more information could be encalming and that the best way to accommodate more information is to attend to it less, as ubiquitous computing intensifies, they argue, "calm technology will play a central role in a more humanly empowered twenty-first century" (Weiser and Brown 85).

It is interesting how Weiser and Brown's follow-up article from Weiser's initial 1991 article actually establishes the need for continuous research and development of ubiquitous computing. At the same time, the later article also contradicts Weiser's earlier claim that ubiquitous computing fits into the human environment, rather than the other way around, since the requirement for a new approach to ubiquitous computing design to focus on "calmness" suggests that it is humans who need to adjust to the demands of the technology. Moreover, calm computing's quest to "never be surprised" signals the quest for total control that is very much a part of the illusion of the technology that also draws from the military logic of deterrence. This article demonstrates how Weiser and Brown's model of the centre and periphery repeats the control and command structure of the military and its strategy of decentralisation under a single command developed since the eighteenth and early nineteenth century. This is also the decentralisation that gave us the Internet during the Cold War, when the Arpanet structure was decentralised to ensure the survival of American military command and communications infrastructure in case of nuclear war (DeLanda, "Meshworks, Hierarchies, and Interfaces" 281). This notion of decentralisation that retains a central command and control now imbues electronic networks and netwars.

In *Networks and Netwars: The Future of Terror, Crime and Militancy,* John Arquilla and David Ronfeldt observe that netwar is an emerging mode of societal conflict and crime adopting network forms of organisation and related doctrines, strategies and technologies of or adapted to the information age (6). Although some protagonists of netwar may aim at destruction, more often than not they prefer the Cold War strategy of soft power, that is, attraction and disorientation, rather than coercion (Arquilla and Ronfeldt 2, 7). The authors further point out that netwar is an ambivalent mode of conflict with a dual nature (Arquilla and Ronfeldt 314) that blurs offense and defense, state and society, the public and private, war and peace, war and crime, the civilian and military, the police and military, and the legal and illegal (Arquilla and Ronfeldt 14). Netwar, a "cross-cutting meta-pattern … network forms of organization, doctrine, and strategy" (Arquilla and Ronfeldt 20), therefore, lends itself equally to globalist and "autonomist" (Arquilla and Ronfeldt 18), to activist as well as terrorist. Today, the reticulated network, highlighted above, has become the archetypical netwar design (Arquilla and Ronfeldt 10), and the "spider's web" network, or "a set of interconnected center/periphery networks" characterise not only social netwars used by activists but also terrorist and criminal networks (Arquilla and Ronfeldt 323).

Nevertheless, utopian views of "network" persist, such as in the notion of the global city. Historically, Claude Henri de Saint-Simon advanced the notion of the global city by combining the metaphor of the organism with mechanism to describe the functioning of society as a network of interconnected parts. At the same time, combining industrialist cause with the virtues of Christian fraternity or communion, Saint-Simon and his followers eventually created a new morality, where industrial interests in production, security and freedom of exchange joined with Christian

notions of spiritual bond and the idea of a single code of morality and ethics (Mattelart, *The Invention of Communication* 85-89). Under this doctrine, redemptive virtues imbued the productions of artificial networks, which in turn spurred the desires for more universalistic projects of communication (Mattelart, *The Invention of Communication* 92-111).

Such Enlightenment notions of the efficiency and perfectibility of human society under a common code are also what led to the invention of cybernetics. Cybernetics is an interdisciplinary science proposed by Norbert Wiener, which brought together a wide area of research from information theory to communication theory and eventually biomedical science, under a standardized system of control and communication based on informational patterns and feedback (Wiener, *Cybernetics* 11-12). Feedback in this instant is understood as a voluntary activity that needs only to be precise, rather than fully conscious and/or excessive (Wiener, *Cybernetics* 6-8), thus paving the way for efficient, "intelligent" machines and strategies. Weiser's utopian view of a network of "transparent connections" across space/time that brings communities closer together is, thus, historically connected to such Enlightenment notions of scientific progress and the perfectibility of human society under one language and/or code. It is, at the same time, inseparable from and a product of military thoughts and strategies.

Furthermore, Weiser's rhetoric cannot be separated from futurology, a practice that took hold in the 1960s, especially in the United States, of technical forecasting designed to announce and/or explain humanity on the cusp of a new information age and, thus, a new universalism (Mattelart, *The Invention of Communication* 73). Futurology works through three different sources, namely, the social sciences, forecasting expertise and geopolitics, and is historically part of the Cold War strategy

of soft power and its tactic of attraction or disorientation, highlighted above. Mattelart recounts that in 1955, the Congress for Cultural Freedom based in Berlin (secretly funded by the U.S. Central Intelligence Agency) held an international conference in Milan on the topic "The Future of Freedom," where a hundred and fifty-six political and intellectual figures gathered to discuss the notion of a "free society." The agenda focused on the "end-of" discourse – the end of ideology, end of politics, end of social class and class struggle, end of protest by intellectuals and political commitment (Mattelart, *The Information Society* 73-74). A community of thought eventually emerged with sociologist Daniel Bell leading the pack with his concept of the "post-industrial society," astutely keeping his distance from the notion of "post-capitalist society" expounded by Ralf Dahrendorf (Mattelart, *The Information Society* 78). In the post-industrial society forwarded by Bell, technical decision-making is valorised and posed as rational, in opposition to ideology that is positioned as emotional. Furthermore, Bell placed scientists and technologists as being above and beyond the influence of ideology, playing key roles in monitoring social changes and anticipating futures in order to minimise indeterminacies in the economic future (Mattelart, *The Information Society* 79-81).

The desire for certainty by governments and corporations eventually led to the growth of networks of forecasting professionals and the proliferation of interdisciplinary think tanks, many of whom subscribe to renowned forecaster Alvin Toffler's idea of "interactive democracy," that is plans to "cable cities and make them the locus of experimentation in techno-communitarian ideology" (Mattelart, *The Information Society* 89).[36] The role of the United States as a superpower ensured the

[36] Toffler also introduced the idea of the "prosumer" in his 1970 book *Future Shock*, where he describes the merging role of the producer and consumer, an idea repeated by the iN2015 Masterplan, highlighted in the previous chapter.

spread of faith in these scientists and academics as well as in the "positive" roles of networks and information in bringing the world together as one. These post-industrialist utopian discourses, nonetheless, belie the fact that the lexicon of "global-ness," historically connected to industrialist (and Christian) interests, is fundamentally about freeing production and consumption from the constraints of national boundaries (Mattelart, *The Information Society* 91-98). Today, they continue to provide the grounding gestures for the current neo-liberal project of globalisation. Adopting revolutionary language, the neo-liberals paradoxically position "network" as a "symbol of the end of contradiction between labour and capital" (Mattelart, *The Information Society* 143), even as its doctrine of the free flow of information entails vital control of networks and a new strategy of global security aimed at universalising the model of "free-market democracy" (Mattelart, *The Information Society* 133).

Weiser's account of a seamless ubiquitous computing set in the future, therefore, depends on a selective "blindness" towards the complex and contradictory history that shapes today's information technologies and telecommunications. For Mattelart, "[e]ach new generation of technology revived the discourse of salvation, the promise of universal concord, decentralized democracy, social justice and general prosperity. Each time, the amnesia regarding earlier technology would be confirmed" (Mattelart, *The Information Society* 23). I argue, however, that perhaps more than amnesia, Weiser's selective "blindness" (intended or otherwise) borders on social manipulation that is productive of sustaining the research and development of ubiquitous computing. In "Technics as Social Practice" Baudrillard argues that every technical practice is a social practice "soaked with social determination;" yet, through the guise of autonomy, technical rationality and objectivity, "it doesn't present itself as such" (51). Technical practice separated from social reason, Baudrillard continues,

becomes a form of social manipulation, a "technique of the *social*" and hence a "technics of power" ("Technics as Social Practice" 51).[37]

Baudrillard observes that while the fifteenth and sixteenth centuries were marked predominantly by avant-garde techniques, the twentieth century was marked by that of military techniques. I have shown that as we enter the twenty-first century, military techniques and technicity, inflected with neo-liberal values and rationality are sustained by the proliferation of information technologies and telecommunications. The result is a technical culture, which grounds itself on and, simultaneously, perpetuates a set of myths about technics. Such myths, according to Baudrillard, include the notion that technical knowledge is itself rational, democratic and virtually accessible to all through academic training and practice. In other words, technics are neutral because they are about the mastery of nature, as opposed to the culture, economics and politics that are concerned with social mastery and organisation. According to this myth, it follows then that individuals, regardless of their social origins, are more naturally and spontaneously equal before technics than they are before culture and art (Baudrillard, "Technics as Social Practice" 52).

However, Baudrillard reiterates that technics is "simultaneously an instrument for restructuring social relations and for elaborating a social rationale" ("Technics as Social Practice" 53). He gives the examples of how technics concerns itself politically with exclusive control of advanced (military) technological operations to the profit of power, and how it discriminates culturally through artificially created hierarchies between disciplines and within the practice of research and science itself – differentiations based on status and not of knowledge or concrete differences in

[37] Baudrillard makes a distinction between "techniques" and "technics" even as both are soaked with social, cultural and political determinations. I believe in his use, "techniques" suggests processes and/or procedures, while "technics" points to principles, beliefs and/or reasoning. I will keep to his distinction here.

knowledge (“Technics as Social Practice” 53-54). This system of technical order and “parallel *system of acculturation*” (55), according to Baudrillard, works through a constructed division between “transcendent” and “banal” technics, where “everyday life, maintained (for strategic reasons) in a state of technical infantilism, would benefit from high tech ‘effects’” (“Technics as Social Practice” 56). Therefore, through the tactical division of technics into the sublime and banal, the fictional and everyday, the prestigious and the obsolete, and between the educated culture and mass culture, advanced technics removes itself from everyday technical practice, identifies itself with science, in order to act as the imagery of banal technics of consumption, as a promise of total technological revolution (“Technics as Social Practice” 57-58).

Weiser’s positioning of ubiquitous computing as part of the future imaginary, just as in the iN2015 video, hence, serves as a promise of total technological revolution, whereby the technologically “new” ubiquitous computing is “perceived as aesthetics and desired for privileged consumption” (Baudrillard, “Technics as Social Practice” 59). So even as Weiser connects ubiquitous computing to the “everyday life,” his technology (and his discourse) is simultaneously set apart from the everyday – as advanced technology (techniques) produced by scientists and/or technologists not for (of) today but for future mass consumption. I argued earlier that Weiser’s attempts at technological continuity link ubiquitous computing with some older technologies, which paradoxically entail a selective discontinuity with history. What I want to add here is how his endeavours at technological continuity, ironically, also entail a further disavowal of the very technologies immediately associated with and fundamentally required by ubiquitous computing, that is, Virtual Reality and

Artificial Intelligence.[38]

In order to set ubiquitous computing apart as avant-garde or technologically new, Weiser maintains a conscious distinction between ubiquitous computing and Virtual Reality and claims that ubiquitous computing requires little or no Artificial Intelligence. These are strategic moves, since at the point of Weiser's writing, Virtual Reality, and especially Artificial Intelligence were facing setbacks and mounting disenchantments over their respective claims and promises. However, while Weiser asserts he is uninterested in creating artificial worlds, such as the way in which Virtual Reality creates a world inside the computer, his alternative of "embodied virtuality," based on freeing information and liberating data from their "electronic shells," paradoxically creates the world *as* a computer. Weiser's liberation of information into the "physical world," in fact, entails the spread of artificiality to all facets of everyday life. This dispersal of data or the logic of simulation, together with the logic of abstraction and participation, as I have highlighted in the previous chapters, leads to the implosion of meanings.

To reiterate Baudrillard's observations on simulation, it is no longer an issue of the replacement of "the real world" since simulation no longer deals with the logic of facts and the order of reason (*Simulacra and Simulation* 16); rather, under its logic, what is "real" and "virtual," "true" or "untrue," have become inseparable, reversible and ambivalent. As information "devours its own content … [and] devours communication and the social," Baudrillard points out, the resulting hyperreality of communication and meaning, the more real than real, devours reality (*Simulacra and*

[38] Virtual Reality here refers to computer-simulated environments that can encompass any of the following: simulation, interaction, artificiality, immersion, telepresence, full-body immersion, and network communication (Heim). Artificial Intelligence denotes the branch of computer science studies that aims, through programming, to create machine "intelligence" or "intelligent" agents that can perceive their environments and take actions accordingly.

Simulation 80-81). Contrary to Weiser's assertion that "embodied virtuality," as opposed to Virtual Reality, does not simulate the "real world" but "invisibly enhances" or "augments" the existing world, simulation does not happen only with full-scale Virtual Reality. Through information technologies and telecommunications and the data subjects they create, as well as the Cold War strategy of attraction or disorientation that pervades networks, simulation is already structuring everyday life. Consequently, Weiser's ubiquitous computing intensifies, rather than reduces, the proliferation of the virtual and artificial.

Moreover, the notion of ubiquitous computing "invisibly enhancing" or "augmenting" the existing world also assumes the technology itself as a benign or transparent medium that manifests its positive or negative aspects, depending on how it is used. This seeming neutrality of the technical object, however, is a consequence of the grand myths of technics that sets it apart from the everyday life. As Baudrillard contends, "the technical objects do not intervene directly in everyday life, as mediators of structures and new social functions, but on the contrary as *already mediated by the idea of technology* and by a metaphysics of rationality" ("Technics as Social Practice" 58). Don Ihde, in "A Phenomenology of Technics," observes that our embodied (bodily) relations with technology often moves between the desire for the transformative power of technology and the contradictory desire for total transparency to escape the material limitations of technology (137-159). This contradictory desire for power and transparency overlooks and neglects the transformational effects of technology in human-technology relationships as the technology "disappears" into the human (truly "become me") (Ihde 139-140). He gives the example of writing as a technology and points to how writing embodies hermeneutic techniques. So what is referred to, is referred to by and through text, while what is presented is a "world" of

the text. Writing as a technology then transforms experiential structures, including how we take the phenomenon of reading for granted (Ihde 145). Then the crucial question from here is what sorts of hermeneutic techniques are embodied in writing/reading through ubiquitous computing?

I have shown earlier that Weiser's notions, rhetoric and prototypes of ubiquitous computing are already mediated not only by a global capitalist work ethics that draws from the time of the Enlightenment, but also its military rationality and strategies. Paul Virilio, in *Pure War*, highlights the importance of disappearance to war, traditionally in the military strategy of camouflage, and increasingly today, in its tactic of dissimulation, of making bodies and people disappear (101-102). Weiser's rhetoric of freeing information from "the limits of individual memory," overcoming information overload through fast and efficient technologies, making ubiquitous computing interactive with or without human inputs, and animating objects previously inert, are all fundamentally about taking humans out of the cybernetic loop, a discourse that corresponds perfectly to the military's vision machines. As highlighted in chapter two, vision machines are capable of automated perception, which then replace humans from the realm of direct observation. In this replacement, human intentionality, responsibility and control are removed, in contradiction to the promise or myth of control. Because vision machines function on absolute speed, they leave little time for human reflection, leading to "blindness" not only to the mediation of their existence under C^4ISTAR techniques and technicity, but also to the violence of its speed and accidents (Virilio, *The Vision Machine* 59-73). This is a central paradox that Don Ihde also highlights, that in the extension of the sense of sight, there is a simultaneous reduction of sight ("A Phenomenology of Technics" 142), and in making technology invisible – relegated to automatic, semi-automatic, pervasive and

mundane contexts ("A Phenomenology of Technics" 156) – we fail to take notice of how they are making humans disappear.

Apart from Weiser's paradoxical disavowal of simulation and Artificial Intelligence, in his contention that the ubiquity of information technologies and telecommunications diminishes computer addiction, Weiser fails to take into account that these technologies in fact draw humans into their electronic circuits. As pointed out in the previous chapter, these technologies do not alienate human participation but draw them into an interaction with the programme and virtuality, precisely because it is not based on a genuine communication with an Other. Crucially, by arguing that ubiquitous computing's transparent connections across space and time bring communities closer together, Weiser also ignores the point made by Virilio highlighted in the epigraph that every technology invented also creates an accident along with it. Moreover, in today's context of globalised networks and distributed but interconnected technologies that function on absolute speed, these accidents are no longer local but general (*Virilio Live* 29-32).

In his pursuit of perpetual technological development, Weiser's vision of a positively transformative, efficient, seamless and empowering ubiquitous computing that simultaneously blinds itself to the negative implications of the technology, is a result of the larger technical culture, underpinned by neo-liberal values and C^4ISTAR techniques and technicity. As Weiser himself ironically points out, the disappearance of technology is a fundamental consequence of human psychology, since "whenever people learn something sufficiently well, they cease to be aware of it" ("The Computer for the 21st Century" 66). Just as Weiser's account of a seamless ubiquitous computing embodies a history of military thoughts and strategies, from total war tactics of "empowering" the fringes, to the Cold War practice of futurology, his

discourse also reflects the dot-com optimism of the late 80s and early 90s. This is why there are many fundamental similarities between Weiser's vision of ubiquitous computing and his contemporary Steve Mann's views on wearable computing. In the next section, I look at how the current changing contexts within universities are shaping the discourses around ubiquitous computing. I argue that the seeming neutrality of technical knowledge is present not only in the utopian views of pervasive computing, but also pervades reflexive academic practices, equally aimed at ensuring the technology's continued research and development.

4.3 Locating the Present: Rethinking the Politics of "Everyday Life" under Neo-Liberal Academic Practices

In an interesting article called "Yesterday's Tomorrows: Notes on Ubiquitous Computing's Dominant Vision," Genevieve Bell and Paul Dourish, two famous contemporary researchers of ubiquitous computing, proposed developing a "'ubicomp of the present' which takes the messiness of everyday life as a central theme" (133). They argue that the dominant vision provided by Weiser in his 1991 foundational article and his subsequent writings, not only articulated a research agenda, but also set the rhetorical tone for ubiquitous computing that has been adopted by researchers ever since.[39] This, the authors maintain, is problematic since Weiser's vision is not only dated and culturally specific to America, it also creates normative social relationships where the problems of today are perceived, framed and understood through the lens of the past or future but not the present (Bell and Dourish 133-134). Through a mixture of content and textual analysis of 108 papers published in Ubicomp conferences

[39] For example, following Weiser's line of argument, Donald Norman in *The Invisible Computer* states that "the best computer is the one that is hardly noticed; we should notice our tools only when they give trouble." For Norman the ultimate appliances are those embedded in clothes and implanted in bodies (243).

between the years 2001 and 2005, Bell and Dourish demonstrate that forty-seven percent of them are framed, just like Weiser's articles, in the "proximate future," that is, a future tense that is "just round the corner." The authors point out that this is not surprising since a quarter of these papers cite Weiser's article, and some even claim his vision as fundamental for their own work (Bell and Dourish134). Drawing from the works of Bruno Latour on the sociology of science, Bell and Dourish paint a larger context of how the academic practice of citation builds intellectual networks by acknowledging intellectual debts, while providing defensible positions for the writers as they align their research with existing paradigms and traditions (135). This practice is significant, as it has created a prevalent situation of framing pervasive computing as exploring prototypes for the future of everyday life, even as the research has been around for over two decades. Furthermore, as the authors point out, this "proximate future" framing not only absolves the technologists from responsibilities for the present, but also continually places ubiquitous computing achievements out of reach, while simultaneously "blinding" it to current and/or culturally different techno-social contexts and practices (Bell and Dourish 134).

Bell and Dourish then provide a competing view by arguing that ubiquitous computing is already here but has simply taken an appearance different from that which Weiser had envisioned. They give two case studies drawn from Singapore and Korea to support this position. Through official reports and statistics, the authors look at the network structure of Singapore, such as the penetration of mobile phone ownership and usage, the wireless hotspots landscape, the success of the cashless, "seamless and safe" transportation system, the Electronic Road Pricing (ERP) system in controlling car movements, the smart-postal network, the CCTV coverage as well as internet and broadband sign-up rates, and argue that Singapore already represents a

kind of ubiquitous computing environment (Bell and Dourish 136). Bell and Dourish contend that ubiquitous computing must be understood also in terms of the collective and community practices that have emerged around the technology. Specifically, they give the example of the SARS outbreak in 2003 and how the Singapore government strategically deployed the Internet and cell phones as a way to distribute critical information and provide "cyber alternatives" to the on-going Ching Ming festival. Online "shrines" were created to encourage the Chinese community to venerate their dead at home rather than at the cemeteries to cut the transmission rate of SARS (Bell and Dourish 136). The authors also give the examples of how the Singaporean community relies on mobile phones for everything from basic communication to social interaction and political engagement, which have in turn spawned all sorts of short-hands and speed in text messaging and the use of Singlish (colloquial English) (Bell and Dourish 136). Moreover, drawing on several official documents from Singapore's Ministry of Information and the Arts, Censorship Review Committee and National Internet Advisory Committee, Bell and Dourish surmise that although Singapore's development as an "intelligent island" raises issues of content, surveillance and control, its "collaborative nature," "clearly articulated principles," "transparency," "vision of cyber wellness… [that] incorporates a sense of personal responsibility" make "collective practice, rather than a set of discrete individual actions" an important new frame for understanding ubiquitous computing (137-138).

Similarly, Bell and Dourish point to Korea as another key example of technological vision rooted in society and/or the collective, opposite to Weiser's imagination based on the individual. As examples, they highlight the views of the Korean Minister of Information and Communication to make Korea "a society where all the people can enjoy the benefits of state-of-the-art IT at anywhere and anytime,"

and the close co-operation between the Korean government and large information technology and network corporations to realise this vision (138-139). The authors also note that in contrast to the urban sprawl of America, the heavily populated high-rise buildings in Korea make wiring up households relatively simple and faster, resulting in cheap and fast Internet connections for the Koreans. Therefore, Korea's physical infrastructures coupled with its cultural practices have enabled it to be one of the most connected countries and leading broadband markets in the world (Bell and Dourish 138). At the same time, Bell and Dourish observe, because Koreans consider their homes as extremely private, socialising, including gaming, has a place also in public spaces like Internet cafes and gaming parlours. Korea, hence, displays different technological usage patterns, in terms of the almost equal numbers of people who connect to the Internet at home and on the move, as well as the number of women slightly outpacing men in the consumption of mobile Internet experiences (Bell and Dourish 138).

Bell and Dourish argue that their instances of ubiquitous computing in Singapore and Korea are different from other studies of daily life in "non-Western" environments because of their departure from the "paradigmatic examples of ubiquitous computing" set by Weiser's vision (139). The authors insist that by focusing on current practices outside research laboratories and recognising the diversity of cultural, social and political contexts, ubiquitous computing research and development can avoid the "misguided" visions of the technology provided by "1950s science fiction's speculations about twenty-first century clothing and gender relations" (Bell and Dourish 139). The authors contend that their "alternative and contemporary views" of ubiquitous computing, based on the "messiness of every day practice," take into account the relational dynamics between people and technologies,

including the fact that infrastructures "must be actively maintained, and relationships to them must be continually negotiated" (Bell and Dourish 139).

Correspondingly, they give three examples to highlight how the cultural production of infrastructures and attitudes toward the infrastructures are themselves messy and full of social contradictions. In the first example, they point to the way Ghana customises second- or third-hand vehicles imported from Europe for their specific context, including setting up networks of makeshift car mechanics across the country. Secondly, they highlight how the International Classification of Diseases in providing a common infrastructure for the collection and comparison of mortality statistics worldwide, ends up complicating funding for AIDS research because AIDS deaths are typically recorded as the result of other infections, even as the patients' compromised immunities were due to AIDS. Finally, the authors show how power sources, with their varying voltage, frequency and socket shapes, highlight the complex realities of uneven distribution of production and consumption of power supplies and the unequal relationship between "Western power" and the "developing world" (140).

Insisting on looking at the present and messy interaction between infrastructure and everyday life, Bell and Dourish maintain that Weiser's seamless ubiquitous computing is too much "a tool for labour" and too narrowly "directed towards the needs of corporate efficiency" (141). Instead, the authors see ubiquitous computing as reflecting existing social and cultural needs and hence "a site of social and cultural production" (141). Recognising how technologies "both exploit and reproduce a range of power concentrations and relationships," the authors suggest that Weiser's vision of a clean, gleaming and seamless ubiquitous computing infrastructure and adoption amounted to a sort of "fundamental technological

determinism at work … one in which technology would play a liberating role" (Bell and Dourish 142). Alternatively, Bell and Dourish conclude, seeing ubiquitous computing as inherently messy, heterogeneous and "characterized by improvisation and appropriation," makes the technology "a resource for active engagement," which the authors surmise is "not a depressing conclusion" but "a rather wonderful thing" (142).

I agree with Bell and Dourish's assessment that Weiser's "proximate future" tone provides a common problematic framework of ubiquitous computing research and discourse, which absolves the technologists from responsibilities for the present. In fact, I contend that such "proximate future" framing testifies to the desire for the promise of the technology to be deferred, just as in the discourse of the iN2015 Masterplan, because it is productive of future waves of research and development. As noted by Robbins and Webster, in *Times of the Technoculture*, the futurists' tactics of discontinuity with the past and present as well as their discourse of an amazing technological future, serves them well as many of them often benefit from engineering and/or financing their predictions into existence (233). One can argue that this is certainly the case with Weiser. Nevertheless, while I applaud Bell and Dourish for departing from Weiser's seamless account of ubiquitous computing by considering the social contradictions and messiness of the present relationships between infrastructure and everyday life, their discourse begs a closer look.

It seems that Bell and Dourish's attempts to situate ubiquitous computing in the present, to take into account the messiness of the technology and everyday life, depart from Weiser's productivist moves. On the contrary, I argue that their discourse, in fact, mirrors Weiser's discourse. Bell and Dourish's arguments, bordering on culturally essentialist views, are themselves productive too of future waves of

research and development, grounded on the basis of “difference” or “alternative” views on the use of ubiquitous computing. Written at a time of growing disenchantments with the “West” and academic focus on “alternative” views to “Western” thoughts, which in turn coincides with the economic rise of the “East,” their article opens up new spaces of enquiry for what they seem to imply as a stagnating “Western” ubiquitous computing research and development. Crucially, Bell and Dourish’s discourse, focused on “difference,” reflects the current impact of globalisation and its technologies on certain academic practices.

The production of “difference” that is tied to globalisation, neo-liberal values and the capability of information technologies and telecommunications to simulate difference for consumption, has pervaded the universities. Bill Readings argues, in *The University in Ruins*, that globalisation is changing the character of the university into a trans-national bureaucratic corporation in the pursuit of “excellence” (3). He contends that excellence, used to gain general assent for this change, however, is an empty signifier that applies equally as a criterion to radically different areas without them sharing any specific qualities or effects (Readings 23-24). In this changing university culture, Readings points out, students are treated like consumers and what is taught and/or researched matters less than the fact that they are done excellently (Readings 11-13). Readings maintains excellence meets the needs of technological capitalism and its production and distribution of information, by allowing for “the increasing integration of all activities into the generalized market, while permitting a large degree of flexibility and innovation at the local level” (32). Excellence, hence, functions as an “integrating principle that allows ‘diversity’ (the other watchword of the University prospectus) to be tolerated without threatening the unity of the system” (Readings 32).

In other words, the proliferation of information technologies and telecommunications, underpinned by the neo-liberal logic of communication and circulation, are structuring universities to focus on producing "difference" as a commodity in the context of the globalised capitalist system of competition. As highlighted before, the notion of communication is fundamentally about unencumbered flow of goods and services and freeing production and consumption from national boundaries. Under this logic of circulation of information, where the value of the message is its circulation rather than its content, relative difference becomes liberated, exalted and equated with regulated exchange. Furthermore, in the current context of the knowledge production economy, academics and researchers become immaterial labour responsible not only for producing informational and cultural contents for consumption, but also for producing subjectivities in the active consumption of such contents to ensure future productions.

Bell and Dourish's ironic comment on Weiser's vision of ubiquitous computing as a sort of "fundamental technological determinism at work," fails to see that their socially deterministic discourse is equally the result of the logic of circulation generated by the proliferation of information technologies and telecommunications. In their simple reversal of valorising banal (everyday) techniques against Weiser's supposed advanced (scientific) techniques, they leave the structure of information technologies and telecommunications untouched, assuming their techniques as fundamentally neutral. So even as the authors highlight how technologies reflect existing social and cultural needs (socially not neutral), their argument that these technologies can also be a "resource for active engagement," improvisation and appropriation, assumes the technology as inherently benign, and repeats the neo-liberal logic of technological empowerment that is structuring the

technologies and that also constitute their discourse.

Through a series of simple binaries and reversals that sidestep the complexities of history and the current globalised and interconnected world, Bell and Dourish pitch their discourse against Weiser's (and those of his followers) by positioning Weiser's views as American and their views as "non-Western." Romanticising the "East versus West" divide, they valorise "Eastern" practices as based on the collective, with close public/private sector co-operations, as opposed to Weiser's "Western" individualism. But as I have discussed in the previous chapter, especially in the case of Singapore, the notion of the collective, embodied in the neo-Confucianist "Asian values" discourse, is a commonly-used ideology by the ruling elites to regulate subjects needed by the technological systems, and maintain their dominance at the same time. Ironically, this "Asian values" ideology is driven by a western neo-liberal rationality that consciously constructs "difference" as a commodity for the globalised capitalist system.

In celebrating "difference," Bell and Dourish fail to see that collectivism and the rhetoric of inclusion (by both the Korean and Singapore governments) belie a surreptitious form of exclusion – the inability of individuals to not partake in the technological development. Returning to the "seamless transportation" of Singapore that they highlighted, the Electronic Road Pricing (ERP) system, which requires all vehicles in Singapore to have a unique in-vehicle identification (IU) unit and smart (cash) card, has made the collection of toll seamless for the government but at the expense of the public. Not only do drivers have to ensure they have sufficient funds in their cash card (and therefore a bank account to top up their cash cards), faulty cash cards and IU units have resulted in wrongful penalties for drivers when the gantries fail to detect these units. Moreover, the ERP system has not led to a reduction in

congestions on the roads, but has instead led to more gantries to be erected all over the island (including expressways), as drivers find alternative routes to travel to work. This has also impacted on non-drivers as public transport fares increased to account for the toll. Moreover, as the transport system becomes automated and cashless, commuters have to pay for their trips on buses and trains via an EZcard, which automatically deducts cash amounts when the cards are tapped on units upon embarkation and disembarkation. On several occasions, commuters have been over-charged because the automated fees have been wrongly calculated (or not updated) according to distance travelled and existing road conditions.

Bell and Dourish's emphasis on Korea as one of the most connected and leading broadband markets in the world, even as they denounce Weiser's ubiquitous computing as too narrowly "directed towards the needs of corporate efficiency," fails to take into account the social contradictions that result from Korea's (corporate) Internet successes. Here, Internet access is seen as benign, if not an empowering condition, as the authors seem to rejoice in the different technological usage patterns, especially the fact of women slightly outpacing men (another axis of "difference') in the consumption of mobile experiences. Consequently, Bell and Dourish pay no attention to how the universal Internet access in Korea is generating Internet addiction to the point of users dropping dead from exhaustion after playing online games for days on end, and where compulsive Internet use has become a national issue, requiring aggressive counter-measures (Fackler "In Korea, a Boot Camp Cure for Web Obsession").

Concurrently, Bell and Dourish's simple dichotomy of "Eastern" collectivism and "Western" individualism ignores the globalist desires for a single collective based on industrialist interests and the belief of Christian fraternity (highlighted in the

previous section), which ground the very notions of communication and network developed in the west. The authors also neglect the close public/private sector co-operations between the military and economy since the time of "Total War," which eventually enabled the American development of information technologies and telecommunications during the Cold War. Nick Turse, in *The Complex*, points out that as early as World War II, American corporate economy and military bureaucracy merged and eventually became a full-blown military-industrial-complex after the war. Today, the military-industrial-complex has not only intensified, but also diversified to become "the Complex." The case of Singapore's iN2015 Masterplan is a clear example of the mutually constitutive relationship between the state, military and industry.

Apart from disavowing the military connection, another public/private sector co-operation Bell and Dourish disregard, directly connected to their own discourse, is that between industries and universities.[40] I have highlighted earlier Readings' point on the impact of globalisation in changing the character of the university. Specifically, the impact of globalisation is re-structuring the ways universities worldwide conduct their research as well. These include the proliferation of networks of research and development alliances among universities, and partnerships between universities and industries, in a distributed knowledge production system (King 53). In this context of increased market relations, universities such as those in Singapore, subjected to dynamic competition, are adopting more trans-disciplinary approaches to research problems, mobilising and not simply managing creative solutions, incorporating greater diversity of sites and types of knowledge production

[40] At the point of their writing, Genevieve Bell is from Intel Corporation, Santa Clara and Paul Dourish is from the University of California, Irvine. One of them is a computer scientist and the other a cultural anthropologist ("Yesterday's Tomorrow" 134).

(geographically, culturally), and demonstrating a more reflexive, rather than objective, tone as the research projects become more dialogic (96-99). Bell and Dourish's research should be situated in this context.

However, despite the trans-disciplinary and reflexive approaches, ubiquitous computing research and development, nonetheless, enacts selective "blindness" to what they include and/or exclude in their discourses. The positioning of Weiser's vision as the dominant vision of ubiquitous computing ignores earlier and other sources of similar visions. Although Bell and Dourish note briefly the "misguided" visions of the technology in 1950s science fiction speculations, their commentary is on the (lack of) accuracy of these speculations in terms of fashion and gender relations, and not on the relationship of these speculations to Weiser's and/or their own discourse. In fact, before the 1950s, the speculative fictions of the early twentieth century, especially those of H.G. Wells, already express visions of incorporating technologies invisibly into everyday life, and in much more ambivalent tones.[41] Selective (disciplinary) "blindness" in this case, enables the repetition of existing paradigms to be couched as "new" and, hence, "progressive." This is productive in terms of the premium placed on predictions in academic-technological-development discourse, closely linked to the practice of futurology.

Although Bell and Dourish position their discourse as "alternative" to Weiser's rhetoric by focusing on the present and messiness of ubiquitous computing and everyday life, their discourse mirrors Weiser's rhetoric in many ways, in terms of

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[41] Although critics of Wells have accused him of advocating utopian views of science and the future, I agree with John Hammond's assessment that Wells is much more ironic in predicting (not advocating) the future (*H. G. Wells* 163-174). In particular, "The Time Machine" touches on the issue of class divide in the extreme and the eventual reversal of the master-slave relationship (*The Complete Short Stories* 9-91). "The Crystal Egg" pre-empts Internet addiction and tells the story of a man who escapes from his unhappy family by gazing into a special crystal that allows him to see into another space/time (625-643).

the kinds of "mess" or social contradictions they choose to ignore and highlight. In their examples of Singapore and Korea, they focus extensively on the positive and sidestep the negative aspects of ubiquitous computing as it structures the everyday life of the respective communities. Notably, in their three examples of the messy interaction between infrastructures and everyday life, none of them is of information technologies and telecommunications. In fact, their discourse on power sources and its uneven distribution reflecting uneven power relations, fails to acknowledge the role of ubiquitous computing exacerbating the situation.[42] As the next chapter shows, the military's demand for power is intensifying as they prepare for network centric warfare, underpinned by pervasive computing. Here, commercial and academic developments form easy sources that can be appropriated for military use.

Therefore, through a series of simple binaries, Bell and Dourish ignore the intricate and mutually constituting relationships between academia, industry and the military, which provide the conditions of possibility for their (as well as that of

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[42] Other concerns of pervasive computing is highlighted in the 2002 study on the potential impact of pervasive computing on human health and the environment, commissioned by the Swiss Center for Technology Assessment (TA-SWISS). Some of the areas of concern that emerged include non-ionizing radiation (NIR), which is expected to increase and impact users who wear these numerous NIR transmitters to greater exposure. What is significant is also how non-users of pervasive computing will be involuntarily exposed to these invisible electromagnetic fields. In addition, stress can result for users from poor usability, misuse, disturbance and distraction. For non-users, coping in a society that has become dependent on the technology and where the infrastructure presents itself as permanent, can be equally stressful. Market imperatives might also restrict freedom of consumers and patients, where they are compelled to use the technology and/or co-finance it against their will (Hilty, Som and Köhler 853-874). Ecologically, the need for scarce raw materials for the production of electronics and the total energy consumption to support the infrastructure may increase sharply, as per pollution, cross-contamination and the problem of toxic waste disposal. For the latter, the small "invisible" microelectronics that are embedded in increasing number of everyday items will complicate waste separation as it makes it difficult for users to distinguish electronics from non-electronics. This will lead to social conflict not only on the personal level but also international level when "rich" countries ship their waste to "poorer" countries for sorting and disposal (Hilty, Som and Köhler 871; Köhler and Erdman 831-852).

Weiser's) discourse and research and development. At the same time, their overly optimistic focus on social and cultural practices, neglects, like Weiser, the transformational effects of technology in human-technology relationships. Recently, the Singapore government announced plans to build a dual four-lane road to ease congestion that will tear into nearly a quarter of an eighty-six hectare cemetery, known as the Bukit Brown cemetery. This cemetery is significant historically and ecologically as it is the burial ground of many of Singapore's famous pioneers dating back to the 1890s, and habitat to eighty-five bird species, a few of them already endangered. Despite numerous protest and petitions, the urban planning in land-scarce Singapore is proceeding. Now, there is a state-funded effort, joined by individuals, to document graves, map and recreate the entire Bukit Brown universe online (Yen "Bukit Brown Battle 2.0"). Since the time of the 2003 experiment with online shrines that Bell and Dourish used to make a case of Singapore as a kind of ubiquitous computing environment, the current virtual conservation effort and transfer of heritage online indicate the expanding virtuality that is reshaping the population's perception of space, heritage and sense of history.

4.4 The Intimate and Reversible Relationships between Science, Technology, Industry and the Military

This chapter has shown how the discourses of Weiser and Bell and Dourish are essentially the same even as they appear as oppositional. Bell and Dourish's discourse is encouraging active subjects in the messy daily improvisation and appropriation of ubiquitous computing, just as Weiser's discourse is producing active subjects in the seamless consumption of the same technology in future everyday life. In this instance, Weiser's mainstream views of ubiquitous computing and Bell and Dourish's

"alternative" views of the same technology form two sides of the same academic-technological-development coin, grounded on "everyday life," to ensure the technology's continuous research and development. At the same time, by simultaneously and paradoxically neglecting the historical and social contradictions underpinning ubiquitous computing in the current context of "the Complex," they obfuscate the fact that C^4ISTAR techniques and technicity are structuring their discourses and pervading everyday life, and academic research and development becoming increasingly appropriable by the military.

In fact, looking at the connections between science, technology and the military, Mendelsohn, Smith and Weingart in *Science, Technology and the Military* observe a confluence in their ideologies. They highlight how in politics, all military preparations are presented as a direct response to threats from outside with science and technology merely serving as necessary tools. Simultaneously, scientific ideology depicts its involvement in the military and corresponding destruction as only playing a patriotic role and ultimately for "truth" and the "betterment" of humankind. In actuality, the authors argue, science and technology are not mere tools, but have an active role in shaping the thinking and actions of political and military leaders; they enable the potential for arms race, which is contingent more upon scientific and technological development rather than upon political and military strategies (Mendelsohn, Smith and Weingart *xii-xx*). The mutually constitutive relationship between science, technology and the military is played out today, where the postulation of threats of annihilation (real or imagined) under the legitimation of military preparedness, carries over to science in a reciprocal expansionist connection, blurring the lines between scientific knowledge and military relevant knowledge. As the authors further point out, today it matters little if technology is developed for

civilian or military purposes; in fact, economic development and weapons development source from the same general stock of scientific and technical knowledge that may be utilised and expanded for a wide range of applications and purposes, both civilian and military. What results, significantly, is a "circulation of elites" in science, technology, the military and industry, where despite differences in style, goals and interests, there remain strong commonalities that allow the elites' mobility across the different sectors (Mendelsohn, Smith and Weingart *xviii-xxi*).

The next chapter returns to Singapore to look at the circular and mutually constitutive relationships between science, technology, industry and the military. Through the mutually constitutive relationship between the iN2015 Masterplan and the Third Generation Singapore Armed Forces (3G SAF), I highlight their common underpinning neo-liberal values and C^4ISTAR techniques and technicity. I emphasise how structures put in place politically, historically and under the rubric of "Total Defence," a complex militarised network and circulation of elites is created. In fact, this chapter situates the iN2015 Masterplan as part of the larger militarisation of Singapore society. I argue that "Total Defence," historically linked to total war strategies and Cold War tactics, not only makes everyone potentially a target for the ideological state apparatuses, but also the target of attacks as a result of the blurring of military and civilian spaces. Therefore, this chapter argues that the iN2015 Masterplan has set up the necessary architecture, produced highly technologised spaces and created insatiable needs for technological consumption using the rhetoric of empowerment, control and inclusion, but what got "liberated" are the technological economy and the military, at the expense of the people becoming targets.

Chapter Five:

The Politics of Science, Technology, the Military and Industry: The Paradoxical and Reversible Relationship of the Third Generation Singapore Armed Forces (3G SAF) and the iN2015 Masterplan

> "We make no enemies. We want no enemies. We have no enemies. But if you want peace, be prepared for war…" (Lee Hsien Loong, Second Minister of Defence (Services) [currently Prime Minister of Singapore], qtd. in K. W. Chin, "Singapore: Threat Perception and Defence Spending in a City-State" 198).

> "We have to invest in defence so that we do not need to go to war. There is nothing more tempting to a potential aggressor than a soft and easy target … If we want peace, we have to prepare for war" (Dr Tony Tan, Deputy Prime Minister and Co-ordinating Minister for Security and Defence of Singapore [currently President of Singapore], "Committee of Supply Debate" n.p.).

> "The technical environment is our hyper-production of obsolescent, fragile, polluting objects… An economy of stable products and of good objects is unthinkable: the economy only develops by hiding danger, pollution, usury, deception, obsession. The economy only lives through the suspension of death that it maintains *through material products* – by renewing the available *stockpile of death*, even if it must arrange it by overcharging for safety: blackmail and repression" (Jean Baudrillard, "Death Trick" 224).

5.1 Connecting the iN2015 Masterplan and the 3G SAF: An Introduction

In the previous chapter, I showed how academia, industry and the military are intimately intertwined and productive of ensuring the continuous research and development of ubiquitous computing or pervasive computing. I also demonstrated how this perpetual technological development, achieved through the discourse of transparent relationships with the technology, simultaneously entails a selective "blindness" to the paradoxes of pervasive computing and its conditions of possibility. This chapter looks at the circular and mutually constitutive relationships between science, technology, industry and the military in the context of Singapore, in particular, through the close connections between the iN2015 Masterplan and the Third Generation Singapore Armed Forces (3G SAF).

In this chapter, I highlight how the specific science and technologies identified and promoted by the iN2015 Masterplan for research and development are the same ones ensuring the current transformation of the Singapore Armed Forces into a network-centric, knowledge-based fighting force. Likewise, the subjects extolled and nurtured by the iN2015 Masterplan not only provide overt support for information technologies and telecommunications industries, but also covert buttressing for the manpower needs of the 3G SAF, pointing to the reversibility of technologies and technical knowledge. Therefore, looking at the discourse underpinning the 3G SAF, I focus on how neo-liberal values and C^4ISTAR techniques and technicity structuring the iN2015 Masterplan are equally present in 3G SAF, and argue that far from being a simple coincidence, their synchronised logic point to the larger militarisation of Singapore society. I emphasise how through structures put in place historically and under the rubric of "Total Defence" promoted by the government and tasked to every citizen, complex militarised networks are created, resulting in a circulation of elites

sharing and perpetuating the same neo-liberal values and C^{4}ISTAR techniques and technicity.

This chapter contains two main sections. In the first section, I concentrate on the discourses surrounding the current transformation of SAF into a network-centric fighting force. Through a close reading of some of the 3G SAF monographs, I draw out the neo-liberal values, C^{4}ISTAR techniques and technicity structuring their discourse. Specifically, I show how the 3G SAF's latest doctrine of Integrated Knowledge-based Command and Control (IKC2), establish transparent and "empowering" relationships with C^{4}ISTAR technologies through the rhetoric of control, speed, accuracy and "intelligent" technologies that obscure the limits and vulnerabilities of these technologies. Simultaneously, by valorising innovative, risk-taking technological subjects, the 3G SAF discourse, paradoxically, entail a careful monitoring of deviating thoughts. Highlighting the paradoxes and reversals underpinning the 3G SAF arguments and logic, I contend that their discourse not only repeats the violence and neo-liberal logic underpinning C^{4}ISTAR technologies, but also turns a blind eye to their limitations, putting everyone at risk.

In the next section, through parallels between the 3G SAF and the iN2015 Masterplan discourse and the same kind of subjects they commend, I contend how structures put in place historically result in the circulation of military elites, the convergence of military, economic and political power, and the perpetuation of their neo-liberal values, as well as C^{4}ISTAR techniques and technicity. Under the rubric of "Total Defence," which draws from Cold War and total war strategies of tactical decentralisation of control, civilian populations are mobilised in the active production and preparation for war. In the intimate and reversible links between 3G SAF and the iN2015 Masterplan, I argue that the iN2015 Masterplan is an operation in the

production and preparation for war rather than a purely economic exercise. Furthermore, I point to how, under the rubric of "Total Defence," security, like consumption, becomes a political technology to ensure the continued production of deadly products and systems, exacerbated by the development of the war economy. Finally, drawing from Virilio, I maintain that deterrence is less about peace than about the perpetuation of war. What results from such exercises are a critical disappearance of civilian space and the clearing away of radical singular thought – thought's ability to decentre itself and see how it is its environment that thinks it. "Total Defence" eventually, turns every citizen into a target not only of defence, but also for attack.

5.2 The Technology and Business of Network-Centric Warfare in the Third Generation Singapore Armed Forces (3G SAF)

In 2004, the Singapore Armed Forces (SAF) embarked on a journey to modernise and transform itself into a Third Generation (3G) network-centric fighting force. 3G SAF aims to integrate the Singapore Army, Republic of Singapore Air Force and Republic of Singapore Navy under a single platform for real-time information sharing and communication in order for the various services to fight as a single unit. Awed by the television images of U.S. attacks on Iraqi targets in the Gulf War that prompted this revolution in Singapore's military affairs, the Ministry of Defence (MINDEF) aspires not only to keep pace with precision strike technologies, but also to keep on building up and maintaining its technological capabilities (*Defending Singapore* 10).[43] In this planned technological build up, nurturing "quality people able to master the new

[43] MINDEF oversees not only the SAF but also, among others, the Defence Science and Technology Agency (DSTA), the Future System Architect group (FSA) and the DSO National Laboratories. For details of the MINDEF structure and websites to the various agencies. See <http://www.mindef.gov.sg/imindef/about_us/organisation_structure.html>.

technologies and weapon systems … to fight smart" also becomes a crucial component of SAF's current transformation (MINDEF 10-11). Hence, accompanying this transformation underway in Singapore's military are a series of monographs in the SAF journal *Pointer*, extolling changes to conventional military mindsets, leadership development, and new strategies for fighting urban warfare, encapsulated in their latest doctrine of Integrated Knowledge-based Command and Control (IKC2). This section of the chapter looks at some of these SAF monographs to pinpoint the neo-liberal values, and C^4ISTAR techniques and technicity underpinning the discourse, as well as the paradoxes and reversals operating in their arguments and logic.

In the first monograph to signal Singapore's revolution in military affairs, entitled "Creating the Capacity to Change: Defence Entrepreneurship for the 21st Century," Choy et al. argued that conventional military mindsets based on the hierarchical command and control structure can no longer deal with today's complex strategic environment (1-64). These complexities, the authors pointed out, arise from emerging trends tied to globalisation and advances in information technologies and telecommunications. Now, due to the proliferation of increasingly powerful computers and advances in life sciences and nanotechnology, the authors contended that radical appropriations of such technologies can have disconcerting effects and gave the U.S. September 11, 2001 tragedy as an example, where an economic superpower with billions to spend on defence cannot prevent the terrorist operation that costs "less than a million dollars" to mount, underlining the asymmetry of power that turns "conventional understanding of power on its head" (Choy et al. 3). At the same time, the authors continued, with the effects of globalisation, such localised problems can and do have significant global effects. Therefore, Choy et al. suggested

changing the military organisational strategy to deal with such complexities – a strategy that operates on a dual nature of effectiveness and efficiency embodied in the old hierarchical order, together with the capacity to change encapsulated in the "free-wheeling and innovative" culture of business entrepreneurship (3-4, 13-15).

Key to the authors' ideas is the creation of "Capacity to Change" (C2C) spaces modelled after complex adaptive system, where leaders and managers provide avenues and the right conditions for multi-disciplinary interactions and creativity to occur "naturally," without them imposing pre-conceived solutions (Choy et al. 3-4, 13-15). In this new (business management) organisational strategy, the new roles of leaders and managers then are to equip their followers and employees with "the right set of cognitive skills to operate in a complex world," and to ensure their people are "motivated, even inspired … to dream, innovate, experiment and try" (Choy et al. 17). However, instead of cooperation, the authors envisioned the C2C spaces to be competitive environments, an "internal market" to test ideas (Choy et al. 18), where only the best ideas get resources for implementation (Choy et al. 24). They argued that instead of the "smooth coordination of cooperation … competition generates energy and unleashes creativity" (Choy et al. 28). Therefore, the authors pointed out, at the heart of the C2C model is the "spirit of defence entrepreneurship," where the "defence entrepreneur" is "empowered with the right skills to take advantage of this creative space" to "independently search and explore, and ultimately define, his own parameters and chart out his own directions" (Choy et al. 18, 21). They added that placing the "individual aspirations" of the defence entrepreneur in a "primary place," a new "moral code" can be struck between the individual and the organisation, where his or her passion can be harnessed as the "engine for organisational change" (Choy et al. 23).

Within the C2C space, Choy et al. added, personnel can tap on other knowledge and perspectives through external networks, which the authors argue are important for MINDEF to guard against intellectual lock-ins and for spawning "interesting hybrids" (31). These external networks also enable complex "real-world problems" to be broken up and distributed throughout the networks, like distributed computing, and be solved beyond the confines of neat disciplinary boundaries (Choy et al. 32). Furthermore, harnessing external networks, like multi-disciplinary think tanks, academic institutions, individual thinkers, et cetera, provides a "'virtual' organisational expansion" needed to deal with the expanding definition of security today (Choy et al. 34). The authors concluded that the example of the U.S. failure to prevent the Al Qaeda attack was due to the former's bureaucratic and hierarchical command and control structure, as opposed to the latter's flexible and complex adaptive system. Choy et al. then point to DARPA's "flat organisation" and innovative culture (56-57), as well as its "ability to adapt to rapidly changing environments and to seek and embrace opportunities in both technology and processes" (60) as a "thought-provoking model" for 3G SAF (46).

Following closely from the first monograph, therefore, the second monograph, entitled "Realising Integrated Knowledge-based Command and Control: Transforming the SAF" (1-58), set out the new doctrine for 3G SAF, which fundamentally argued for leveraging on C^4ISTAR technologies. In the second monograph, Lee et al. highlighted how advances in information technologies and telecommunications are creating new operational concepts as exemplified by the 1991 Gulf War, the 1999 Kosovo campaign and the recent Ops Enduring Freedom in Afghanistan. Additionally, the authors pointed to the declining cost of information technologies and telecommunications and the "innate strength of our people" – youths

"bred on a diet of the Internet and are experts at computer games" – as key reasons to pursue the doctrine of Integrated Knowledge-based Command and Control (IKC2) to guide SAF's current transformation (Choy et al. 7). The authors stressed that IKC2 is an information-led revolution in military affairs as it harnesses the latest C^4ISTAR technologies to "do things faster and better" for network-enabled, knowledge-based warfare, predicated on the "Observing, Orienting, Deciding, Acting" (OODA) loop, while simultaneously aiming to disrupt the enemy's OODA cycle (Choy et al. 12-13).

Fundamental to the OODA loop and structuring the IKC2 architecture are a pervasive "always available" network, networks of interconnected sensors, automated "intelligent" agents, and a database of "past knowledge" and models that provide the commander and decision-maker "contextualised information" and support for "better decisions, quicker" (Choy et al. 15-16). In short, hoping to exploit technological advances in pervasive computing, precision strike technologies and new fighting concepts, Lee et al. proposed the following code for 3G SAF – "see first and see more," "understand faster and better," "decide better and faster" and "act faster and more decisively" (14). The authors claimed that IKC2 "will enhance the quality of decisions through the new knowledge that is created through collaboration in the information domain." They declared that IKC2 "reduces uncertainty," results in better and faster decision-making that, in turn, enables a "higher tempo of operations" (J. Lee et al. 17). In fact, the authors argued that the possibilities with IKC2 are endless, depending on how innovatively exploited the technologies are in the war-fighting processes. Drawing from the experiences of the U.S. Navy, they highlight that the "kill factor more than doubled for a network-centric force" (J. Lee et al. 16).

To assuage apprehensions among the military personnel, Lee et al. stressed that C^4ISTAR technologies play "supporting" roles to the commander, who remains at the centre of the information cycle and decision-making process (J. Lee et al. 19). Sensors will act as "eyes and ears of the war-fighters," while "intelligent data fusion algorithms" will provide the commander with "a consistent battlefield picture" and "heightened situational awareness" (J. Lee et al. 19-20). Additionally, "intelligent software agents" will consolidate and "interpret" the various relevant data to "produce knowledge" and help the commander plan his mission (J. Lee et al. 20-21). The commander can also use "advanced" war-gaming and simulation tools to generate and evaluate possible courses of action to help him come to a final decision (J. Lee et al. 22-23). The authors contended that this "man-man-machine interaction" is crucial to the command and control system, where "the machine 'presents' knowledge to the commander to enable him to make critical decisions" (J. Lee et al. 23). They stressed that network-centric warfare, through digitalisation and networking, allows the sharing of information across platforms, and enables synchronisation among the services and dramatically increases combat power and speed (J. Lee et al. 45). It reduces uncertainty because of the network of sensors providing fast and "accurate" information, and facilitates key decisions on "when to engage a target and which shooter/weapon combination maximises the probability of a kill" (J. Lee et al. 47). Network-centric warfare, therefore, they argued, provides commanders increased control in dictating the sequence of battle and nature of engagements (J. Lee et al. 48). In terms of the range of hardware and software needed by the system, the authors proposed an "enterprise architecture" based on "plug and play" characteristics to allow for "device independence;" in other words, "no restriction on the types of applications and devices that can be "plugged" into the system" (J. Lee et al. 26).

As part of the IKC2 implementation, Lee et al. restated the need for a more flexible and flatter command and control structure, where top-down strategies co-exist with bottom-up experimentations to enable a new culture of "innovation and intelligent risk-taking," and where failures are tolerated and experimentation encouraged (35). In fact, the authors pointed out that because technological developments have historically and fundamentally shaped new and more "effective" ways of fighting, it is the "thought and innovativeness of the individual" that will be crucial for the 3G SAF transformation (J. Lee et al. 30-33). Hence, experimentations, the authors argued, are critical since network-centric operations are "non-intuitive" (J. Lee et al. 48). Additionally, Lee et al. argued the 3G SAF's transformation requires the adoption of a "new strategic deterrence that relies not so much on retaliation as on prevention" and which, "demands a balanced application of both civil and military power to shape behaviour" (51). Under this "new" strategy of deterrence, human actions are recognised as having both physical and psychological effects that can potentially affect everyone and not just the enemy. Moreover, the authors pointed out, these effects cannot be isolated and can be cumulative over time, across different realms from military operations to the economic arena, influencing national and even international politics (J. Lee et al. 53). Hence, Lee et al. called for "effects-based operations" that are "focused on actions and their links to behaviour;" in short, on the "human dimension of war" such as will and shock (52). To achieve "effects-based operations," the authors proposed creating a cycle of actions and reactions that is repeated many times in different contexts from crisis, to war and peacetime interaction (J. Lee et al. 53). "Effects-based operations," the authors concluded, should be the ultimate aim of network-centric operations, where a series of outcomes can be identified and, in turn, feedback for planning, effective mobilisation of diverse

knowledge and expertise, as well as for agility and co-ordination in operations (J. Lee et al. 54-58).

However, not everyone in the SAF is enamoured by the IKC2 doctrine.[44] One notable response from Lieutenant (LTA) Ng Pak Shun, a Weapons Systems Officer argues that the use of technology to dictate future battles can backfire due to the technology's inherent limitations ("Realising IKC2" n.p.). Quoting from Virilio, he contends that technological innovation is not an "unambiguous good" and that it is crucial to recognise the "possible side effects of a technology-driven military revolution" ("Realising IKC2" n.p.). Although technology has played a key role in warfare development, Ng points out that the use of computers throughout the history of Cold War and beyond, where machines are replacing humans in information gathering and decision-making processes, are not "necessarily successful examples of military transformation" and have had "detrimental effects on the U.S. military" ("Realising IKC2" n.p.). Such problems and failures of technological development, Ng argues, must be placed alongside the usually acknowledged successes, in order to understand the cost and benefits of military innovations ("Realising IKC2" n.p.). Turning his attention to the IKC2 architecture, Ng counters that pervasive coverage of

[44] For example, in monograph four, "Spirit and System: Leadership Development for a Third Generation SAF," K. Y. Chan et al. provided a historical account of the first and second generation SAF, their respective philosophies, values and management styles (1-82). They highlighted the tensions that developed in the 1990s, when SAF adopted market-based, commercial human resource practices and systems in its design of military careers, before arguing for a balance between spirit (embodied in the first generation SAF) and system (exemplified by the second generation SAF) to meet the needs of the current SAF transformation. Although the authors urged SAF leaders to acknowledge and embrace the "postmodern military," they added that the leaders have to develop critical thinking, challenge their own thoughts and assumptions, not follow blindly others' models, concepts and doctrines (32-38), and finally, not let the "market-driven occupationalism" seep into SAF, risking its "institutional soul" (42). This monograph seems to indicate that the 1990s divide may still be present today but more crucially that not everyone in SAF is convinced by the IKC2 doctrine or at least the neo-liberal values underpinning the doctrine.

the battle-space as highly unstable and unreliable, since the military might ignore other sources of non-machine generated information and disinformation, either because of limitations of the technology or caused by the enemy, affects the reliability of information ("Realising IKC2" n.p.). Ng brings in examples from the Vietnam War and wars in Iraq to highlight how active and passive disinformation successfully worked against the technologically advanced U.S. military ("Realising IKC2" n.p.). Moreover, he argues, the instances of "friendly fire" incidents in both Gulf Wars attest to the fallibility of machines ("Realising IKC2" n.p.).

Relying on machines to provide contextualised "knowledge," Ng argues ignores the assumptions built into the specifications of the technology. He highlights the nuclear war game developed by RAND in the 1950s as an example of how war-gaming exercises easily skew the military's perception of reality and distort human understanding of warfare with dire consequences. In the RAND war-game simulation, there was an inherent bias for conflict over cooperation because it was modelled on a zero-sum rationality that disregards "non-rational" choices and the changing dynamics during battle. Apart from technology shaping strategic thinking through human interactions with machines, Ng contends that language too is part and parcel of the technology ("Realising IKC2" n.p.). Technology-specific discourses, he highlights, have a way of shaping thoughts with their built-in assumptions and rationale, which "necessarily excludes people who do not understand or agree" with them. He gives the example of how the use of various acronyms in nuclear warfare confined the discussions of military leaders to a fixed set of concepts and reason, without leaving space for certain questions and values to be asked and expressed. In Addition, Ng highlights how abstract theories such as "strategic stability" and "collateral damage," remove military thinkers from reality by shaping their thoughts

according to “surviving weapon strength instead of human deaths” (“Realising IKC2” n.p.).

The use of “intelligent” agents to help commanders make “faster and better decisions,” as envisioned by IKC2, Ng continues, paradoxically, subject humans under the speed of information transmission, compressing the time-frame for warning and human decision-making, which in turn creates costly mistakes. Hence, Ng draws attention to the “danger of military accidents” as “humans are forced to react more and more quickly to high-speed technological systems” (“Realising IKC2” n.p.). Thus, Ng cautions, the trumpeting of speed, accuracy and consistency of machines is problematic since it encourages humans to become more reliant on these machines for technological output and eventually for decision-making. This then demands “absolutely error-free computations of machines that are themselves built by fallible human beings,” which means “soldiers will live and die on the best guess of programmers” (“Realising IKC2” n.p.). Finally, Ng points out, the success of the IKC2 structure rests on the assumption of the enemy having more inferior technology and/or functioning under the same logic of technological reliance. This rationale, he argues, fails to take into account that the disparity in technology is precisely what drives the enemy to asymmetric warfare.

Although Ng’s points are made in the context of the military and its use of (the wrong) technology, I want to appropriate his arguments and extend it further to discuss the 3G SAF as well as the iN2015 Masterplan. The great trust in digital technologies and telecommunications, whether by 3G SAF or the iN2015 Masterplan, belies the fact that computers are imperfect and prone to mistakes. Sources of system failure, whether in a centralised or decentralised architecture and apart from human errors, can range from incorrect or incomplete system speculations, hardware failure,

hardware design errors, software coding errors, software design errors, network failure, and any unusual combination of the above (Borning 122-123). In fact, software developments are based on an evolutionary process, where failures *are expected* in order to lead to corrections (Parnas 221-227). Lee et al. seem to be aware of this fact when they appeal for failures to be tolerated in the new culture of innovation and risk-taking. Yet their calls for risk-taking, and for fully exploiting information technologies and telecommunications to see the endless possibilities of IKC2, ignores the chance that any arbitrary creations can result in programmes too complex for humans to grasp, and where minor discrepancies in code can have catastrophic results (Parnas 220-221).

Furthermore, as failures in software remain latent until they are uncovered, this then creates the need for incessant testing and simulations, with no guarantee that coding errors will be discovered, especially in large, complex systems (Ornstein 27-29). In the IKC2 architecture, the chances of the commander, at the centre of the information cycle, dealing with disinformation without discerning it or realising it too late, are relatively high. Moreover, as Ng points out, the enemy can also cause disinformation, which means that the network of "ready-to-use knowledge" available "anytime, anywhere and to anyone," in turn, demands a spiralling need for cryptographic techniques and number-crunching power. DeLanda, in *War in the Age of Intelligent Machines*, highlights that information technologies and telecommunications have given rise to intelligence acquisition, which in turn created the need for counter-measures. The proliferation of wireless networks, in particular, with its broadcast aesthetics, has placed a premium on the development of cryptological techniques (DeLanda, *War in the Age of Intelligent Machines* 180). DeLanda points out that just as military needs for miniaturised components affected

the evolution of the computer, their demand for cryptanalysis, in turn, necessitates increased speed (*War in the Age of Intelligent Machines*, 213-214) and the intensified development of Artificial Intelligence. Although currently, human analysts are still in the loop in encoding and decoding communication, with increasing military demands for speed in reconnaissance, espionage and counter-espionage, and the continued development of Artificial Intelligence, the function of intelligence analyst will become increasingly automated (*War in the Age of Intelligent Machines* 181, 213). Additionally, DeLanda observes that since cryptanalysis involves detecting patterns out of random images and/or texts, it thrives on redundancy, which means "every new generation of computers redefines the limits of security of a given cryptosystem" leading to "another spiralling arms race, not of missile power but of number-crunching power" (*War in the Age of Intelligent Machines* 209).

Therefore, the claim by Lee et al. that "contextualised information creates knowledge," "certainty" and "accuracy," paradoxically, fails to take into account how "contextualised knowledge" is not only vulnerable, but also limited in the awareness of its own range of hardware and software failures. Their claim also neglects how the processes of digitalisation and networking, fundamental to network-centric warfare, are paradoxically the root cause of inaccuracy and uncertainty since digitalisation is inherently reductive, and networking is potentially about disorientation. That the contextualised information is filtered through "intelligent" software agents, not only creates more complications, but also a false sense of security. This is because Artificial Intelligence is made of precise rules written in formal languages interacting unambiguously with mathematically encoded descriptions of objects, situations and relationships (Athanasiuo 234). In short, Artificial Intelligence is not about actual open-ended worlds but artificially tidy worlds constructed by computer programmers.

These "intelligent" systems cannot always cope with the complexity of real world scenarios because they cannot break their own rules, determine for themselves the relevance of new and unexpected information and certainly do not know the limits of their own knowledge, nor recognise them (Athanasiuo 241-242). As J. Lee et al. point out, network-centric operations are "non-intuitive;" their solution, ironically, is to turn to more "experimentation in the information domain" to generate a database of models for commanders to tap for their decision-making, influencing the latter's intuition with non-intuitive machine models.[45] In fact, the "effects-based operations," proposed by the authors, turn humans into "automatons" through their repetitive cycle of actions and reactions, numbing human will and shock in the process (J. Lee et al.). Since the limits of Artificial Intelligence are ultimately imposed by the nature of the computer programmes themselves, while their complexities reside in the ingenuity of programmers to code instructions (Ornstein 12), Ng is therefore right to highlight that in network-centric warfare, the soldiers' fates lie in the hands of the programmers.

I also agree with Ng about the costly mistakes and military accidents that will unfold (or are already unfolding) as humans have to react ever faster to high-speed technological systems, which, paradoxically, entails their further dependence on the same "intelligent" machines for technological output and decision-making. However, I want to push this point further by pointing out that Lee et al.'s promise of "control," "better" and quicker decisions for the commander, obfuscates the crucial detail that the desire for speed is precisely what is necessitating the removal of humans,

[45] One simple example is how PowerPoint, a common programme used in office presentations, has crept obsessively into the daily lives of military commanders of Nato forces in Afghanistan because of the way the programme is able to create hierarchical ordering of a confused world. This has in turn caused serious concerns among military personnel that PowerPoint creates the illusion of understanding and control, stifles discussion, critical thinking and thoughtful decision-making (Bumiller "We've Met the Enemy").

including their will and responsibility, from the cybernetic loop. Hence, contrary to what Lee et al. claim, in the IKC2 architecture, humans are playing the supporting roles to these technologies and not the other way around. The relegation of control from humans to machines is what provides the conditions of possibility for the IKC2 model and network-centric warfare. As DeLanda points out, "this migration of control from humans to hardware, from hardware to software, and from software to data is at the source of machine intelligence, and thus at the origin of autonomous weapons systems" (*War in the Age of Intelligent Machines* 157-158).

Although military demands will intensify the development of Artificial Intelligence, as highlighted above, this only creates another false sense of security. DeLanda notes, "even if Artificial Intelligence is not at present sufficiently sophisticated to create true 'killer robots,' when synthetic intelligence *does* make its appearance on the planet, there will already be a predatory role awaiting it" (*War in the Age of Intelligent Machines* 1). In fact, DeLanda stresses, the "*will* to endow machines with predatory capabilities has been institutionalized in the military" (*War in the Age of Intelligent Machines* 128). This is certainly apparent in the IKC2 discourse, where Lee et al. obsess over the "kill factor" of the network-centric force, its combat power and speed, and its ability to maximise "the probability of a kill." Unfortunately, the increase in combat power and speed of such "intelligent" machines has actually made war more deadly for civilians. Contrary to the claims of "accuracy," the advancements of technologies have led to a corresponding rise in civilian casualties. While civilians constitute fifty percent of war casualties in World War II, this figure rose steadily to eighty percent in the 1980s and ninety percent in the 1990s, with women and children forming the vast majority of these casualties (Turpin 4). To further exacerbate this tragedy, the mediating effects of technology and

the notion of "collateral damage," both mask the material conditions of war and human violations (Hammer 294).[46]

Technological developments are not value-free, and certainly their related discourse is also proper of the technology. This is why the both the iN2015 Masterplan and 3G SAF discourse reflect C^{4}ISTAR techniques and technicity, which include the logic of deterrence, disappearance and tactic of dissimulation, that is, making bodies and people disappear. Just as the television images of U.S. attacks on Iraqi targets are highly sanitised and carefully managed, the iN2015 Masterplan and 3G SAF discourse, too, conscientiously control and shape the views surrounding its desire to integrate through information technologies and telecommunications. So, apart from establishing transparent and "empowering" relationships with C^{4}ISTAR technologies by obscuring their limits and vulnerabilities, their discourse also functions to carefully monitor and contain deviating thoughts. In the case of 3G SAF, as Lee et al. point out, the strategy of deterrence is about shaping behaviour, which has physical and psychological effects that can be cumulative over time and potentially affect everyone and not just the enemy. A series of rebuttals and counter-opinions, thus, ensued following Ng's feedback.[47]

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[46] Philip Alston, in a report to the UN Human Rights Council, warns that the deployment of killer drones by the U.S. to kill terrorism suspects is undermining the global constraints on the use of military force. He adds, because the drones are operated thousands of miles away from the battlefield and entirely through computer screens and remote audio-feed, they are encouraging a "'Playstation' mentality to killing," including killing many hundreds of innocent civilians. Such operations, especially by the CIA, are also bypassing the rules of war, as the agency remains accountable only to its own paymaster (The New York Times "Rules of War Hit by Killer Drones").

[47] As I have indicated in footnote 41, Lieutenant Ng is not the only one unconvinced by the IKC2 doctrine underpinning the 3G SAF transformation. With the exception of the first rebuttal that addresses Ng's response specifically, the rest of the 3G SAF discourse are directed more generally to all military personnel.

In the first rebuttal to Ng, Lieutenant Colonel (LTC) Roland Ng, LTC Khee Loon and Dr Kenneth Kwok insist that IKC2 is "people-based rather than system-based" ("Viewpoints: IKC2" n.p.). They point out that IKC2 needs and depends on people who are "properly educated and trained, and willing to embrace new concepts" in order to translate "information to knowledge to decisions and finally into military actions" ("Viewpoints: IKC2" n.p.). They stress that technologists and systems developers are playing supporting roles to translate knowledge and concepts from the commanders into supporting architecture, infrastructure and combat systems, and not the other way around. The IKC2 concept, according to the authors, is "in essence an operational framing … to help SAF develop warfighting concepts in the Information Age rather than a purely technological framing" ("Viewpoints: IKC2" n.p.). The authors reiterate that the "thought and innovativeness of individuals … to make the right decisions and enable the right actions in network-centric, knowledge-based environment" are what is needed to realise the potential of IKC2. While tacitly agreeing on the vulnerabilities and limitations of technologies, the authors point out that if there is belief in the potential of technology, then the conclusion should be to "seriously and actively" resolve the limitations of the technologies, rather than to give them up ("Viewpoints: IKC2" n.p.).

Another noteworthy counter-opinion piece is by the Director of Networked Systems, Defence Science and Technology Agency (DSTA)[48] and his team who argue "IKC2 is about how we harness the power of the networks to win" (Teo et al., "Tech Edge" n.p.). They point out "it is often said that NCW [Network-Centric Warfare] is

[48] DSTA is a statutory board set up under MINDEF to advise it on all defence science and technology matters. It also designs, develops and maintains Singapore's defence infrastructure, and acquires weapon systems for the SAF. See <http://www.dsta.gov.sg/index.php/About-Us/>.

not about the technology but the people. This may be a truism but technologies must underlie this RMA [Revolution of Military Affairs]" (Teo et al., "Tech Edge" n.p.). The authors stress that the key is to identify the right technologies "to realize a quantum jump in operational capabilities" and to master these technologies (Teo et al., "Tech Edge" n.p.). They continue their argument by listing seven key technologies that would dramatically change the way SAF fights with IKC2, which include networks, sensors, power, shooter, security, "sensemaking" and collaboration. Teo et al. point out that to pursue information anytime, anywhere, ubiquitous connectivity is fundamental, but this, in turn, creates demand for bandwidth. To meet military bandwidth demand in built-up areas (like Singapore), they suggest exploiting commercial off-the-shelf wireless communications such as WiFi and WiMax for affordable options. Additionally, meshed networks with their "spider-web" configurations can be used for mobility, since every node in this architecture can be a router or "intelligent access point." To complement the "network backbone," Teo et al. suggest a matrix of "unblinking eyes," but they also point out that the main challenge for sensing is persistence and coverage because the "man-in-the-loop" sensors are limiting and expensive. They recommend innovatively harnessing unmanned technologies instead, since these are becoming commonplace, highly affordable and capable of a multitude of functions, including autonomous operations.[49] As for unmanned ground sensors, Teo et al. advocate using commercial versions, called Motes, commonly used by scientists to monitor climates and

[49] In fact, the authors point out that Singapore is already exploiting unmanned technologies in the form of the Unmanned Surface Vehicles (USVs), used by the navy for "force protection" at safe "stand-off distances." In addition, the "high-speed" Protector USVs, equipped with an electro-optic system and remote-control General Purpose Machine Gun, have been deployed in the recent Gulf war to "establish and enforce protection zones." The authors further note that a similar manned operation would require a sizeable crew.

ecological environments. They argue that with "commercial push" these unmanned sensors, which can be disguised as natural objects like rocks and "adapted for battlefield deployment," will become affordable enough to deploy widely.

Highlighting how the Gulf Wars have demonstrated the precision of shooters, Teo et al. suggest the "innovative" use of networks to "coordinate and mass multiple shooters" for "not just one target but over an influence network of interdependent targets." Here, the authors argue that cost effectiveness is an important factor since it is not sustainable to buy expensive missiles to shoot "cheaper targets" like Unmanned Aerial Vehicles (UAV). In terms of the power requirements of network-centric warfare, according to the authors, reliability and scale are the two key challenges for distributed, mass and persistent sensing, as well as for mobility. Drawing on the experiments to power laptops by a couple of companies, Teo et al. note that fuel cells, in particular, show the most promise with their higher energy storage capacity and amenability to miniaturisation, although they still present over-heating problems and the need for replenishment. The authors declare "innovation in the area of power supply for mobility must be made," including tapping on natural resources and combining various power sources (Teo et al., "Tech Edge" n.p.). To address the issue of information overload and how "the commander may become the 'weakest link' in the system of systems," Teo et al. propose capitalising on computing to "alleviate the cognitive limitations of humans and at the same time amplify his cognitive strengths" for a more adaptive, ready, sharper, faster and coherent SAF. Giving the example of "sensemaking" – information technologies "built around the cognition of the human" – the authors argue that this system is coded with "a sound understanding of human cognition" to aid analysts in monitoring electronic communications. In addition, Teo et al. point to web-enabled technologies that facilitate collaboration as a good

resource for SAF to engage in "creative ways of knowledge sharing" to nurture "a new generation of network warriors" for them to fully "synchronise their actions" and "fulfil their goals."[50] However, recognising the dangers of being dependent on the network, the authors state that network security is an important issue to address. They turn to examples from Hewlett-Packard, IBM and the academic research on Artificial Immune Systems, where adaptive networks with sensors that can automatically detect viral attacks, take remedial actions, and even develop solutions that parallel biological immune systems, as possible solutions for cyber-attacks. Teo et al. conclude that these seven technological challenges are also opportunities for IKC2, depending on the "ingenuity of people to innovate with them to create viable solutions," which is why they argue that SAF "must tap the technology savvy generation … to invent and break new ground in both concepts and technology" ("Tech Edge" n.p.).

In both rebuttals to Ng's feedback above, there seems to be a tension between whether IKC2 is about the people or the technology. In the first rebuttal, the stress appears to be on the people, when Roland Ng et al. argue that IKC2 is "people-based rather than system-based." In Teo et al.'s response, they emphasise that technologies "must underlie" Singapore's Revolution in Military Affairs. I argue, however, that this dichotomy between the people and technology is, in fact, a false construct. In Roland Ng et al.'s argument, the people needed to ensure the success of IKC2 are those who are "properly educated and trained." However, these are not any subjects

[50] Deputy Prime Minister (then Defence Minister as well) Teo Chee Hean in an interview with *The Straits Times* points out that the training tools of SAF have to be changed because national service-man of today are "very well educated, very much able to do things on their own, look for knowledge themselves." He adds, "If you don't give them laptops and computers, they will feel very odd." All recruits are now issued with laptops for them to take online tutorials on assembling and handling their rifles, throwing grenades, carrying out first aid and clearing battle obstacles, before hitting the fields for their hands-on experiences (Chow "SAF Upgrade Plugs into Software Phase").

but technological ones “willing to embrace new concepts” (R. Ng et al. n.p.). Yet these subjects have to embrace not just any concept but specifically the IKC2 concept. In other words, IKC2 depends on subjects who are already enframed with its logic and techniques to sustain its operations and technologies. The false binary created by Roland Ng et al. between “operational framing” and “technological framing” therefore erases the fact that operations, including concepts and discourse, are all part and parcel of the technology. Additionally, the hierarchy Roland Ng et al. make between the commanders and the technologists and systems developers ignores the point that underlying the IKC2 structure are programmes that are prone to fail, regardless of the commanders’ knowledge. Moreover, the hierarchy Roland Ng et al. creates between the commanders and the technologists, acts as a simple reversal of power relations that, ultimately, leaves the IKC2 structure and framing intact, thus ensuring its continuance. Despite, or precisely because of, Roland Ng et al.’s emphasis on innovative technological subjects, the limitations and vulnerabilities of technologies can be side-stepped and turned into opportunities for further technological productions.

As a mirror to Roland Ng et al.’s discourse, the priority Teo et al. place on the IKC2 technologies, in turn, ensures the production of innovative, technological subjectivities, since these subjects are needed to “master” these technologies. It is hence unsurprising that Teo et al.’s conclusion about technological challenges being opportunities for “people to innovate” and “create viable solutions” is almost identical with Roland Ng et al.’s closing. Their mutually reinforcing discourse of emphasising the IKC2 people and the IKC2 technologies, work through inducing “blindness” to the paradoxes of such technologies and subjects, as well as their reversible relationships. In other words, the IKC2 system requires both the technologies and the

technological subjects to function in synch with each other and with its codes; in short, to be the same. Since humans are more adaptable than machines, it falls on humans to make the necessary changes. So, despite Roland Ng et al.'s attention to the people underpinning IKC2 and Teo et al.'s discourse on "mastery" over IKC2 technologies, these technologies, in fact, structure human thought and determine the course of human actions, not the other way around. As Teo et al. ironically point out, "technologies must underlie RMA," and this is what is demanding the SAF to transform, dictating changes to human mind-sets and practices, in order to meet the requirements set by the technologies.

Therefore, in Teo et al.'s discourse of human "mastery" over technologies, their suggestions, paradoxically, entail turning humans into machines or removing them from the cybernetic loop altogether. In the first instance, Teo et al. (just as J. Lee et al.) turn to computing to "alleviate the cognitive limitations of humans" and "amplify" their cognitive strengths. This desire to turn humans into machines, by synchronising human thoughts with machine logic, suggests enframed minds that think like machines. These enframed minds work using machines as the measure of and for understanding the human condition. The example of "sensemaking" highlighted by Teo et al. above, where information technologies "built around the cognition of the human," obscures the fact that these technologies' "sound understanding of human cognition" are an imprecise science modelled after machine logic to begin with. Cognitive psychology, which developed in America during World War II, is a war product that draws on earlier communications theories, specifically information theory and cybernetics (Edwards 209-237). Fundamental to cognitive psychology is the reductive idea of human as "an information processing system, in a precise, quantifiable sense" (Edwards 212) and conversely, the notion of information

machines as potential minds (Edwards 236). This "neat" reversibility between humans and machines, of course, entails a disembodied information theory and cybernetics and a simultaneous dematerialised notion of the body.[51] Hence, it is not surprising that as Teo et al. look to machines to "amplify" human's "cognitive strength," they simultaneously champion adaptive networks modelled after biological immune systems, which are themselves referred to by popular shorthand as the "body at war," although immunology actually works as a complex regulatory system not so easily characterised.[52]

In the second instance, taking humans out of the cybernetic loop because, as Teo et al. argue, they are "the 'weakest link' in the system of systems" and "expensive," reflects enframed minds under the logic of the technology's speed and efficiency. Efficiency is, of course, part of the capitalist and neo-liberal logic of profit maximisation. As the previous chapter showed, the development of cities and their technologies are as much the result of war as of mercantilism, and as Virilio contends, "wealth is the hidden side of speed and speed the hidden side of wealth" (Virilio and Lotringer 44). It is apparent throughout Teo et al.'s discourse that "cost effectiveness" is a major consideration in the appropriation of technologies from non-military

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[51] In *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature and Informatics* (1999), Katherine Hayles traces the historical development, through the Macys conference, of the disembodiment of information theory and cybernetics and argues that this invariably led to a simultaneously dematerialised notion of the body. She highlights how at the foundational era of cybernetics, in order to make the theory of communication and control apply equally to machines, animals and humans, new ways of looking at humans and their neurological functioning had to be formulated. As a result, instead of machines becoming more like humans it became the other way round, where hu mans were made to be more like the machines. Finally, she points out that as information became disembodied and the organism dematerialised, the merging of two different systems can finally occur and what emerges is the notion of the cyborg. Although Hayles correctly attributes the post-human condition and the ontology of the cyborg identity to the foundational era of cybernetics, she ultimately appeals for an embodiment of information through her focus on cyberpunk fiction and seems to tacitly embrace the post-human condition.

[52] See Lugwig Fleck's *Genesis and Development of a Scientific Fact*.

sources, and in the push for "innovative ways" of harnessing certain technologies. Therefore, despite the warnings by Lieutenant Ng of "friendly fire" in the Gulf Wars, Teo et al., paradoxically, argue for "innovative" use of the network to "mass multiply" the "precision" shooters used in the Gulf Wars as a more "sustainable" option to using expensive missiles to shoot "cheaper targets."

Capitalist rationale, underpinned by neo-liberal values, in fact pervades the larger 3G SAF discourse. The rhetoric of Lee et al. highlights how the declining cost of information technologies and telecommunications, as well as a "ready-made" population of technologists, form the key reasons for the IKC2 doctrine. MINDEF too argues that technology is a force multiplier and leveraging on it increases "individual combat effectiveness" or allows the military to "do more with fewer people" (*Defending Singapore* 56). In particular, neo-liberal values are clear in Choy et al.'s suggestions of the "defence entrepreneur" and C2C space, inspired by the "free-wheeling and innovative" culture of business entrepreneurship. Their discourse of the defence entrepreneur as an active, competitive individual "empowered" to pursue his or her aspirations independently, engages the political economy of the subject to produce innovative, technological subjects. These subjects, as Choy et al. point out, are crucial for the organisational change of 3G SAF, but what they fail to reveal is that there are limits to their "empowerment." In the C2C space where defence entrepreneurs gather, the Complex Adaptive System that the space is modelled after is actually based on an inherently self-same (fractal) system.[53] Therefore, despite Choy

[53] I argue that this is so especially in the context of the military space. Although complexity does arise from the clash of opposite forces, these are at the same time marked by a "unity of opposites." Furthermore, complexity is usually found in living organisms subjected to evolution or in complex adaptive systems that have a long history and have grown over a long period of time, which 3G SAF is not. See Complex Adaptive Systems Group at < http://www.cas-group.net/>.

et al.'s claims of individual "empowerment," there is no room for individual deviation (as Lieutenant Ng's case demonstrates) from the prescribed role of the defence entrepreneur, which is to be a competitive, motivated, innovative, risk-taking "network warrior."

In fact, it is precisely through the rhetoric of empowerment and a series of false binaries (between competition and cooperation, the individual and the organisation) that Choy et al. produce competitive, motivated technological subjects, who also function under a "moral code" to, ultimately, serve the organisation. This neo-liberal strategy reflects that used by Singapore's ruling elites to govern the rest of Singapore society, highlighted in chapter three. It is obvious that the "defence entrepreneur" of 3G SAF is not far off from the "risk-taking, entrepreneurial" subjects nurtured by the iN2015 Masterplan. Furthermore, the competitive environment in the C2C space proposed by Choy et al. that is, paradoxically, based on an inherently self-same system, parallels the larger national discourse of meritocracy, vis-à-vis the collective, espoused by Singapore's ruling elites. Choy et al. and Teo et al.'s insistence on relying on technologies in critical situations despite their limitations and vulnerabilities, points to a strong desire to believe that these technologies *will* work, a faith in technology that pervades the government and many parts of Singapore society, noted even in the early years of nation building. Chan Heng Chee observes:

> The Singapore approach to government – as an exercise in state management – has its roots in the current widespread social doctrine originating in the West that Technology holds all the answers to the important problems facing human civilisation and that society is better off with a rational application of scientific techniques to production

> and administration as if administration could be separated from politics. ("Politics of an Administrative State" 2)

The next section, therefore, looks at the intimate and reversible links between 3G SAF and the iN2015 Masterplan to highlight the larger architecture of Singapore. I show how structures put in place historically and under the rubric of "Total Defence" result in the circulation of military elites, the perpetuation of their neo-liberal values, as well as C^4ISTAR techniques and technicity – in short, in the militarisation of Singapore.

5.3 The Militarisation of Singapore Society: The Intimate and Reversible Links between 3G SAF and the iN2015 Masterplan

Comparing the discourse between 3G SAF and the iN2015 Masterplan, many parallels can be drawn in terms of how they deploy constructed binaries and the political economy of the subject to produce the technological subjects needed for their projects. At the same time, by rendering invisible the contradictions and paradoxes underpinning pervasive computing, which is presented as benign, efficient, seamless and empowering, normative relationships are established to the technology that, in turn, ensure the technology's continued consumption, research and development, as well as the perpetuation of their techniques and technicity. This synchronicity of discourses between the 3G SAF and the iN2015 Masterplan, in fact, points to the larger militarisation of Singapore society, where military, economic and political powers converge to the point that it is difficult to tell them apart.

The militarisation of society, Patrick Regan observes, in *Organizing Societies for War*, is a process that involves the whole of society and not just the military-industrial complex (*xiv*). To reflect on how militarised a society is, he argues, it is not

enough simply to look at the size of the society's military and defence industry. What is also crucial is the organisation of the political, economic and social aspects of the society around the production and preparation for war. The author points out that the mechanisms through which citizens are socialised to accept and participate in the mobilisation process are numerous. These include, primarily, the creation of a perpetual expectation of violence, where the ruling elites continually point to threats to extract internal compliance, and the use of symbols of nationalism to obtain popular support for increasing military influence over civilian affairs (Regan 1-2). According to Regan, a militarised society, therefore, is one where the military penetrates deeply into civilian life and where civilians play an equally important role in military affairs. The blurring of military and civilian spaces, their close contacts, confluence of interests and cooperation, in turn, result in a resemblance between military officers and civilian executives in politics, science and business, and where the military becomes mixed in the government and large corporations. In this instance, the author points out, it makes no sense to question if civilians control the military since the military, economic and political powers have become so dependent on each other, with goals and interests so complementary, it is difficult to tell them apart (Regan 5-6).

In the case of Singapore, the birth of the nation coincided closely with the emergence of its military and defence industry. In 1965, Singapore seceded from Malaysia and became an independent state. Its small size (physically and in terms of population size), volatile geopolitical and race relations with its neighbours and within itself, as well as the imminent withdrawal of British troops that had till then guarded Singapore as its colonial trading port, ensured the mostly immigrant populace was quickly and easily galvanised to support the national defence objectives. The

Singapore conscription policy, which requires compulsory national service for all male citizens passed swiftly in 1967, and the Singapore Defence Fund launched in 1968, collected within one-and-a-half years S$8.5 million, mostly contributions from individuals, companies and institutions (H.C. Chan, "Singapore" 139-142; Singh, *The Vulnerability of Small States Revisited* 11-19).[54] So right from the start, Singapore civilians and military are intimately linked, with many regarding national security as inseparable from national and economic development (Chin 219).

This intertwined relationship between national security and economic development extends to the Singapore Defence Industries. The Singapore Defence Industries began in 1967 to produce small arms ammunition, mainly to meet the nation's political and military needs. At that time, the political reasons stemmed from the "suddenness" of independence and the need for surviving a politically unstable context. Militarily, having its own defence industries (in niche areas) allowed Singapore to reduce its reliance on foreign suppliers and be self-sufficient. It also guaranteed Singapore its own supply and maintenance of critical systems, and enabled imported technologies to be adapted more specifically to local conditions. Economic imperatives for developing the defence industries, however, were not paramount until the late 1980s when the continued heavy military expenditure became hard to justify and sustain for such a small country (Singh, *Singapore's Defence Industries* 11, 38-59; Bitzinger 261-262). The Singapore Defence Industries was renamed Singapore Technologies in 1989 to downplay its military role and to reflect the long-term

[54] Although there were grievances from national servicemen over the conditions of training and army life that played out in the newspapers, these were quickly put to rest through a combination of laws against public complaints, the setting up of proper channels within the army to handle the complaints and the banning of certain newspapers. By 1976, national service became a non-issue for the ruling elites (H. C. Chan "Singapore" 144).

importance of its industrial role (Singh, *Singapore's Defence Industries* Preface).[55] This name change signals not only how defence and economics are intimately connected and reversible, but also how defence is assumed in technologies. Today, not only is Singapore Technologies (Engineering) a vital component of Singapore's defence capabilities, supporting 3G SAF with high technology weapons, essential products and services, it has also become the leading and most advanced arms producer in the region (Singh, *Singapore's Defence Industries* Preface; MINDEF, *Defending Singapore* 67).

The success of Singapore's defence industries has been attributed mainly to the quality of its skills and expertise in research and development, a direct result of the government hand-picking the best of Singapore's engineering and scientific brains for the defence of Singapore (Singh, *Singapore Defence's Industries* 35-36; Bitzinger 266). Although the economic success of Singapore yielded tangible benefits for SAF in terms of the correspondingly high defence budgets, the increasing convergence of skills for both defence and economic development, nevertheless, created a competitive environment for the elite manpower needs of the military. Therefore, as early as 1971, and to ensure the military has its share of the "best and brightest," the government inaugurated the SAF Overseas Scholarship scheme, where academically talented national servicemen are sponsored through tertiary education at prestigious foreign universities.[56] Upon their return, these scholars are bonded to the SAF for eight years, given "market-rate" salaries, promoted rapidly and often co-opted into the government decision-making spheres (Huxley 2-6). To further make military careers attractive, MINDEF in 1982 introduced a "dual-career" scheme where middle- or

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[55] See Singapore Technologies (Engineering) at <http://www.stengg.com/home/home.aspx>.

[56] Since then, two other prestigious SAF scholarships have been added, the President's Scholarship and Overseas Merit Scholarship.

high-ranking scholars are seconded to positions in civil service or statutory boards, on two-year appointments. Crucially, upon their retirement from active duty in the SAF, these scholars can expect to be appointed senior positions in the public sector (6-7).

Since its inception, of the two hundred and sixty-nine servicemen awarded the SAF Overseas Scholarship, six have gone on to become ministers, while another twenty-one hold high-level positions in public service (Yong, "Six Join Ranks of 'National Resource'").[57] Even for those who do not make it to public service, a past career in the military almost invariably provides a bright future in the economy. As observed by Chan Heng Chee in the 1980s, "in the Singapore Armed Forces dissatisfied young officers do not stage coups. They merely resign to join the lucrative private sector with their highly marketable skills" ("Singapore" 147). Therefore, just as defence provides security for economic development and economic growth sustains defence capability, their seeming competition for similar manpower is solved by the creation of a circulation of elites who move seamlessly from one sector to another. This is still the case today and will become more so in the future as SAF's transformation into a network-centric, knowledge-based outfit merge with the iN2015 Masterplan for an "intelligent nation, a global city, powered by infocomm" (IDA, "iN2015 Masterplan" n.p.).

Apart from compulsory national service for the men, the setting up of the defence industries, and the creation of a circulation of military elites, another policy

[57] Currently, ex-SAF scholars in the Singapore Cabinet (out of fifteen appointments) include: Lee Hsien Loong (Prime Minister of Singapore), Teo Chee Hean (Deputy Prime Minister and Coordinating Minister for National Security and Minister for Home Affairs), Lim Hng Kiang (Minister for Trade and Industry), Dr Vivian Balakrishnan (Minister for the Environment and Water Resources), Lim Swee Say (Minister, Prime Minister's Office), Gan Kim Yong (Minister for Health), Lui Tuck Yew (Minister for Transport and Second Minister for Foreign Affairs), and MG(NS) Chan Chun Sing (Acting Minister for Community Development, Youth and Sports and Minister of State, Ministry of Information, Communications and the Arts). See <http://www.cabinet.gov.sg/content/cabinet/appointments.html>.

that intensifies the intertwined relationship between Singapore civilians and the military is the "Total Defence" policy, formally instituted in 1984. "Total Defence," conceived on the notion that modern wars are "no longer pure confrontations between armies, but conflicts involving entire nations and peoples," includes "psychological defence," "social defence," "economic defence," "civil defence" and "military defence" (Foo and Rocha 83). "Psychological defence" calls for the commitment and confidence of Singaporeans in the defence of Singapore. "Social defence" stresses on the population working, playing and living together harmoniously regardless of race, language or religion. "Economic defence" safeguards the economy to continue functioning in times of emergencies, war or threats of war, so that "life goes on as normally as possible" (Foo and Rocha 83). "Civil defence" organises and trains civilians how to respond during emergencies, and "military defence" ensures that SAF is operationally ready to ensure Singapore's peace and security, and "contribute towards regional stability" (Foo and Rocha 83).

"Total Defence," therefore, aims to unite and commit all sectors of society to the defence of Singapore and its national interests. This is "an all-round deterrence effort in which every citizen plays a part" (MINDEF 12). Such efforts include public emergency exercises, the setting up of civil defence grassroots organisations, the training of civil defence volunteers, and the National Education programme launched in schools in 1996 to enhance the continuous commitment of citizens to the nation (MINDEF 12). Critically, the "Total Defence" policy has ensured a stable defence budget (currently capped at six percent of GDP) for the SAF's "relentless" build-up and "incessant securitisation" of the nation (Tan and Chew 247-248). It has further allowed military spending to be hidden in estimates of national and/or economic development and opened up the nation's entire population and resources for military

use (Chin 204, 219). Indeed, the "Total Defence" policy harks back to the "Total War" strategy initiated by militaries during the eighteenth and early nineteenth century, where military powers are strengthened through the strategic mobilisation of civilian populations in the production and preparation for war. It also draws on the Cold War tactic of attraction and disorientation, rather than coercion. Here, the populace are mobilised, through the discourse of defence that obscures its character as a preparation for war, structurally, institutionally and morally to see defence positively and essential to the survival of the city-state.

This tactical decentralisation of control, empowerment of peripheries to consolidate the centre is evident in the 3G SAF discourse. Hence, contrary to Lee et al.'s point (in the previous section) on the "new" strategy of deterrence adopted by 3G SAF, this strategy is not a new development. The 3G SAF discourse, in fact, reflect the national discourse of deterrence that, ultimately, draws from total strategies strategies and Cold War techniques and technicity. Choy et al.'s text, for example, suggests tapping networks outside the military, not only to guard MINDEF against intellectual lock-ins, but also to provide it a "'virtual' organisational expansion" to generate solutions for the military and to spawn "interesting hybrids." This is similar to Lee et al.'s example of the "enterprise architecture" based on "plug and play" characteristics that allows all types of applications and devices to be "plugged" into the IKC2 system. Likewise, in Teo et al.'s analysis, scientific and technological research and developments, from businesses to academia, are all potentially appropriable for military use. Moreover, as they highlight, with "commercial push" or mass consumption, some of these technologies can be applied widely as they become "highly affordable." Even within the military, Teo et al. advocate tapping the technology-savvy generation and deploying web-enabled technologies that facilitate

collaboration among “network warriors” to fully “synchronise their actions,” “fulfil their goals,” and to ultimately serve the organisation. As Teo et al. point out, a vital result of IKC2 is better command and control.

In this sense, “Total Defence” is what Virilio contends as the “Total Peace of deterrence” or “Total War pursued by other means” (Virilio and Lotringer 39). Hence, the iN2015 Masterplan should be regarded as an operation in the production and preparation for war, than as a purely economic exercise. This is especially so since representatives from MINDEF, DSTA and Singapore Technologies (Engineering) form part of the iN2015 Masterplan’s Council and Working Groups, advising on the kinds of information communication-savvy workforce and technologies needed for the future of the nation (IDA, “Innovate. Integrate. Internationalisation” 138, 141). In fact, the intimate and reversible links between 3G SAF and the iN2015 Masterplan can be exposed by the infrastructural and manpower needs to make IKC2 a success. One of the pre-requisites for IKC2 is a communications infrastructure not only robust but also cheap enough to support the network of sensors for enhanced and shared situational awareness among the various military services and among the different levels of command (J. Lee et al. 10, 15; Chen et al. 42). To this end, the iN2015 Masterplan’s focus on developing grid computing (highlighted by Choy et al. earlier) “essential in furthering research capabilities,” and its aim of wiring up the whole of Singapore with an ultra-fast broadband network to meet gaming and industry needs, is liberating too for 3G SAF (IDA, “Orchestrating Global Supply Chains” 16). A case in point is the iN2015 Masterplan’s successful implementation of the wireless mobile WiMax (highlighted by Teo et al. above) for the maritime industry.[58] This

[58] WiMax (Worldwide Interoperability for Microwave Access) is a wireless wide-area broadband access technology constructed on the IEEE 802.16 standard, which departs from the 802.11 Medium Access Control standard that is connectionless and based on

infrastructure allows ships that call on the port of Singapore wireless mobile broadband connectivity up to 15km from Singapore's southern coastline (IDA, "First in the World"). Appropriating this commercial WiMax solution, 3G SAF created the Command Post of the Future (CPoF), a flexible architecture where military commanders can explore and experiment with new fighting concepts in operational contexts, be it from the air, land or sea domain, without compromising on the speed and quality of communications. Furthermore, by spreading out geographically and without depending on a single command post, CPoF is seen as enhancing military survivability. According to 3G SAF, experimenting on commercial WiMax solutions has "allowed warfighters the opportunity to concentrate on new concepts of fighting and information sharing" (Chen et al. 43).

Additionally, harnessing and modifying commercial off-the-shelf technologies is aiding 3G SAF in several ways. As highlighted in chapter three, off-the-shelf interactive computer games, in particular, benefit 3G SAF by providing a cheaper and more convenient alternative to engaging professional game developers for customised game content under strict licensing rules. They also make attractive recruitment tools and cost-effective training conduits for a game-savvy generation of (future) "network warriors." Engaging civilians and to further exploit this game-savvy generation, 3G SAF together with the DSTA have extended their reach to involve academia as another ready source to meet their military needs. For example, Nanyang Technological University (NTU) and DSTA have teamed up with the University of Southern California (USC) to create applications of technology for gaming, media and defence applications (NTU and DSTA, "Unleashing Creative Technologies"). SAF

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a listen-before-talk model. WiMax, on the other hand, uses as a basis the bandwidth-on-demand model, which is connection oriented, supports multimedia as well as centralised control and scheduling (Poslad 352).

and DSTA have also tied up with Nanyang Polytechnic to get the younger polytechnic students to test their military systems, so that their engineers can find out what features the youths like about their consoles and panels. The students' feedback will then allow the military to develop new machines that will be familiar when the time comes for these students to enlist in the army. As Chief Armour Officer Philip Lim points out, "it's important to incorporate their feedback so when they come into the force, they will feel absolutely intuitive when using the systems that they are accustomed to" (Chow "Students Get to Test War Machines"). To ensure the military bring teens on board "as early as possible," there are plans to expand these tie-ups to include upper secondary students in the future (Chow "Students Get to Test War Machines").[59]

This engagement with students is in accord with the iN2015 Masterplan's push, especially in schools, for sophisticated and innovative use of the latest technology to establish Singapore as a digital media and entertainment capital, discussed in chapter three. Seen in this light, the iN2015 Masterplan's deployment of education to serve the needs of mutated capitalism is also extremely crucial for the military, since the reversibility of technologies and technical knowledge erases the fine line between the objectives of the 3G SAF and the iN2015 Masterplan. However, the recruitment of younger and younger students in Singapore to test war technologies, in the guise of games, brings up ethical issues about the exploitation of children in the service of the military and the kinds of subjects such action encourages. The conflation of playing computer games with military training can have far-reaching implications on teenagers, since computer games glamorise war by providing impressionable players with an avenue to fantasise about military missions

[59] The typical age for polytechnic students is between seventeen to twenty years old and for upper secondary students, between fifteen and sixteen years old.

without the real dangers (Hertz 212) and sanitise violence through their mediating effects. This lethal combination may very likely produce future soldiers who think of war as exciting, cool and just a game.[60] Equally important, the lack of objections from parents and the active participation of schools in such exercises points to the convergence of military and economic interests in the larger militarisation of Singapore society.[61]

In this mutually constitutive relationship, defence and economic development have become indispensable to each other, but ultimately, both require a willing and competent society as a foundational base for their expansion. Therefore, through "Total Defence," military control is achieved not by military force, but by means of motivation and mobilisation via accepted social orders and technologies, as the intimate and reversible links between 3G SAF and iN2015 Masterplan show. When societies become highly militarised, Regan observes, the civil sectors, particularly the

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[60] The 2007 assault of unarmed civilians in Baghdad by an Army Apache helicopter, while the soldiers joked and jeered as they shot the people, is a good case in point. In the aftermath of this leaked video in *WikiLeaks.org*, veterans point to military training as, primarily, an exercise to overcome the fear of killing another human, and seeing it as a game is one way to create the psychological distance from the "enemy" (The New York Times "Psychologists Attempt to Explain Airstrike Video"). This example, however, also indicate that computer games and simulation are being faithful to its source and original purpose.

[61] The irony of this situation is that video game addiction is becoming a growing problem, prompting the government to set aside S$10 million to fund cyber-wellness projects. Nearly nine percent of youngsters are found to be addicted to video games in Singapore, putting the proportion of problematic gamers here slightly higher than the U.S. and Australia, but lower than South Korea and Germany (Chua and Poon "Stress May Turn Youngsters"). In another study funded by the Ministry of Education and MDA, 3000 primary pupils and secondary students in Singapore were tracked between 2007 to 2009, and it was found that eighty-four percent of students who were already addicted to gaming were still hooked two years later. The remaining sixteen percent managed to kick their addiction, while one percent of those not originally hooked became addicts. This study also found that video game addiction can fuel depression, as opposed to the conventional view that it is the other way around (Chua and Poon "Many Gamers"). Another worrying trend of video game addiction in Singapore is the profile of addicts are getting younger, from the typical fourteen to fifteen year-olds, to eleven to twelve year-olds (Musfirah "More Gaming Addiction").

industries, media-entertainment and services arms, become active participants in the military mobilisation and socialisation efforts. Through such efforts, the public learns to accept the elites' worldview as their own and becomes an easy advocate for war preparations, perceiving military service, military production and "national security" as noble values performed by outstanding citizens (*Organizing Societies for War* 6-10). In this case, technological development, as exemplified by the iN2015 Masterplan, engages the whole of Singapore society in the militarisation process.

At this point, it is worthwhile to bring in Louis Althusser and his "Ideology and Ideological State Apparatuses" to point out how the iN2015 Masterplan and its projects are themselves already shaped by a larger techno-military-culture present at the founding of Singapore as an independent state and extend beyond the city-state's shores (121-173). According to Althusser, ideology is a system of ideas that is imbued with a structure that makes itself seem real, immutable, even as it is a representation of human relations and their conditions of existence (151-155). Pivotally, for Althusser, "the category of the subject … is the constitutive category of all ideology" (160). Conversely, the "obviousness" of subjectivities and the "transparency" of language are all ideological effects (161). In other words, "ideology has always-already interpellated individuals as subjects … [and] individuals are always-already interpellated by ideology as subjects" (Althusser164). Furthermore, Althusser points to how ideology exists materially through apparatuses and their techniques and how these in turn shape the consciousness, beliefs and actions of subjects (156-159). The use of education by the iN2015 Masterplan to shape active technological subjects not only reflects a long-standing national strategy, but also demonstrates how education is one of the most dominant ideological state apparatuses engaged by mature capitalist states, whereby specific relations of production (or the ideology of the ruling elites)

are inculcated and learnt (144-145). The iN2015 Masterplan's targeting of not only the existing manpower pool, but children as early as in kindergarten, moreover, points to how the "ultimate condition of production is therefore the reproduction of the conditions of production" (Althusser 123). In other words, the technological subjects active in the innovative consumption and production of information technologies and telecommunications provide the condition of possibility for the iN2015 Masterplan and 3G SAF.

Nevertheless, for ideology or interpellation to work, Althusser points out, individuals need to acknowledge or accept the hailing (166). This is why it is crucial for ideology to make itself transparent and to interpellate the individual as a free (empowered) subject (169). The iN2015 Masterplan's deployment of the rhetoric of empowerment, control and inclusion, coupled with the idealised image of Singapore as a seamlessly wired up global city, functions to valorise and entice individuals into active consumption of information technologies and telecommunications. This consumption itself then functions not only to perpetuate the ideology of the ruling elites, but also the digital logic underpinning information technologies and telecommunications. In situations where there is non-conformity, these can be quickly corrected or addressed by using other state apparatuses, such as through legal means. One example is that of the resistance posed by private home-owners to cable up their home with the new fibre-optic Next Generation Broadband Network. This has prompted IDA to put their foot down to enact fines of up to S$1000 a day for condominium management committees who refuse to cooperate (H. H. Chua "Condo Must Allow"). Meanwhile, IDA is proposing changes to its building code to legally require all new homes to be ready for this fibre-optic broadband services, and for building owners to set aside additional space in their premises, at no cost, to house

mobile telephony equipment. IDA's director-general of telecoms and post Leong Keng Thai noted, "With the increasing pervasiveness of smartphones and high mobile penetration rates in Singapore, mobile operators need to meet increasing expectations for mobile services" (D. Chin "IDA Updating Building Code"). This circular chain of discourse and events, where needs are created that then justifies further needs is also present in how the government engages the whole of Singapore society in its militarisation process.

Regan points out that in militarised societies, threat perception has become increasingly driven by social, political and economic factors, even after the actual threat dissipates. He observes, "the perception of threat is still a necessary justification – because the society does not view the production of war as an intrinsic good – but the threat is no longer what drives the [militarisation] process: the process now drives the threat" (Regan 19). This is why in the official discourse on "Total Defence," despite "Total Defence" mirroring "Total War," there is a crucial disavowal of the latter. In the 1995 inaugural issue of *Total Defence Focus* or *TD Focus*, a newsletter circulated nationwide to "remind our people of the importance of Total Defence," Dr Tony Tan, then Deputy Prime Minister and Minister for Defence, wrote:

> In modern warfare, an aggressor wages Total War where he can use propaganda to play on people's fear and apprehension or destroy a country's cohesion by exploiting language, race or cultural differences. The only response to Total War is Total Defence and Total Defence requires Total Participation. ("A Milestone" 2)

The crucial disavowal of "Total War" in Total Defence works by first creating a false binary between the "war" and "defence." This then allows the official discourse to distance itself from what "Total War" entails, that is, propaganda and the constant harping on people's fears and apprehensions to get their cooperation in the production and preparation for war, as demonstrated by the quotations from Singapore's ruling elites at the start of this chapter. In the same 2003 Committee of Supply Debate, Dr Tan justifies the maintenance of a high defence budget stating, "Without security, there can be no economic development or political stability. There will be no foreign investments … And, most critically of all, without security Singaporeans will have no confidence in our future" (2).

The need for security, however, is as much the cause of circumstances as of the effects of politics. Anthony Burke, in *Beyond Security, Ethics and Violence,* points to the "vampyric" and paradoxical nature of security; how, like a malevolent parental power, it is a "source of revulsion and struggle, as of comfort" (55-56). He argues that with contemporary states, security functions less as an end than as a form of power. As a political technology, it mobilises

> horror and pleasure, coercion and desire in equal measures, through linked systems of language, force, administration and freedom. Security is both a mode of administrative and governmental action – bureaucratic, ideological, military and economic – and a system of 'truths' that reach into people's hearts, framing their identities, feelings and hopes. (Burke 6)

Burke further points out that the power of security as a form of political technology draws its power partly from its aporetic structure (32). In other words, security, like consumption, becomes a productive force, a system of politics grounded on insecurity or the impossibility of total security.

The creation of "a common feeling of insecurity" Virilio highlights, is what "will lead to a new kind of consumption, the consumption of protection," that will "progressively come to the fore and become *the target of the whole merchandising system*" (*Speed and Politics* 122). In short, the consumption of security is shaping subjects into producing technological weaponries. Hence, the consumption of protection, paradoxically and conversely, is linked to the production of deadly products suggested by Baudrillard in the epigraph. To be sure, Singapore's need for security has turned into a lucrative reason for the continued production of deadly weapons and systems. In the context of Singapore Technologies (Engineering) posting a record order book of S$10 billion in 2008, Chan Chin Bock, the former chairman of the Economic Development Board, argues that defence is one of the key industries that will propel Singapore economically forward because of its "man-made competitive advantage." He contends, "We have skills in micro-electronics, quality control, computer, information technology and software. The defence industry requires all of those skills brought together in one" (Kor "Defence Harnesses Singapore's 'Man-Made Competitive Advantage'").[62] Therefore, in this age of deterrence and with the development of the war economy, Virilio maintains, "logistics has become the whole of war" and "war is no longer in its execution, but in its preparation" (Virilio and Lotringer 103-104). Deterrence then is, ultimately, not about peace but "Pure War" or the "infinite preparation" or "perpetuation of war" (Virilio

[62] The other industry identified by Chan to also drive Singapore economically forward is biomedical sciences.

and Lotringer 104), and peace and security are its grounding gestures. The belief in peace "by means of the ultimate weapon" is "obscurantism" not only of the accidents that are tied to these technologies, but also of the disappearance of civilian space through militarisation (Virilio and Lotringer 67-68). Virilio adds that in this "era of *the integral accident*" (emphasis in original text), the speed of the military-industrial-complex is the driving force of cultural and social development (*Virilio Live* 172, 182). However, in this process, the world is not simply transformed by the speed of light, it becomes the speed of light, as in globalisation and its demands of "real time" (185), and the city is not only subjected to general policing, but also becomes overexposed (*Virilio Live* 187-188).

The politics of science, technology, the military and industry is what characterises the global city. Ryan Bishop and Gregory Clancey, in "The City as Target, or Perpetuation and Death," argue that the global city is also a city of targets, equally for global capital investments and the military (74). The authors point to the "imprint of the Cold War" that is everywhere in the global city, from its infrastructure and technologies to its practices, including the range of civil defence exercises and emergency plans (Bishop and Clancey 75). Bishop and Clancey insist, "Global cities became, and remain, global insofar as they are targets for attack. It is their status as targets that renders them, de facto, 'global'" (75). They stress the dual nature of the city as target for both "settlers and sackers" and as something to "shoot *for* as well as shoot *at*" (Bishop and Clancey 64). Therefore, ignoring the negative aspects in the discourse about global cities and global urbanism, they conclude, must come at a cost (80).

Under the rubric of "Total Defence," where the production and preparation for war now involves the entire populace, the roles and desires of civilians and the military are becoming indistinguishable. In this disappearance of civilian space, radical singular thought and responsibility are cleared away as well. This erasure of singularity is not necessarily achieved through repression only; rather, it works also through a process of persuasion, disorientation and induction into the governing codes. Hence, under the "Total Defence" strategy everyone becomes a target of defence, and the special focus on children and education, to reiterate Althusser's point, is to ensure the reproduction of the conditions of production. That is, in this case, defence entrepreneurs who are also competitive, motivated, innovative, risk-taking network warriors. The role of information technologies and telecommunications is crucial for this process of reproduction and induction, because of their C^4ISTAR techniques, technicity and neo-liberal rationality, but also their aesthetics of disappearance and digital logic of participation.

A good example of how these technologies entice subjects into consuming their codes is the N.E.mation (pun on animation) competition. This competition targets youths using unconventional media as part of the National Education outreach programme for all schools, under the "Total Defence" policy. It provides a platform for students to express their ideas on "Total Defence" through animation, and has received very positive responses from students because National Education is made a fun subject through new media.[63] As Associate Professor Koo Tsai Kee, then Minister

[63] SAF too has jumped on the new media bandwagon in producing an eighteen-part mini-series, to be uploaded on YouTube, to highlight the nine-week-long Basic Military Training stint all Singaporean men have to go through when they turn eighteen. The objective of the series is to emphasise the need for national service. Deputy Prime Minister Teo points out that besides the troops, there is a whole eco-system essential for the defence of Singapore and these groups, including families of

of State for Defence reports in parliament, students, including female students, are increasingly won over to the idea of "Total Defence" and the unconventional engagement efforts have "paid off handsomely" to the extent that "women [are] suggesting that girls should do National Service too" ("Head J: Ministry of Defence" 40-41).[64] However, the enthusiasm around "Total Defence" and its technologies comes at a price. It is instructive that the essay by Bishop and Clancey was completed just prior to the September 11 attack. It is a clear reminder that Singapore's ambition to be a global city that necessitates the military targeting of every citizen in the defence of Singapore is also making everyone a potential target for attack. Virilio notes in *Pure War* that with the proliferation of information technologies and telecommunications, the margin or space for movement also decreases (76). Singapore's strategy of deterrence, based on the active production and consumption of C^4ISTAR technologies and technicity, is precisely what will fuel and abet these

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servicemen and employers, need to and can be reached via new media (Chow "Coming to YouTube").

[64] Indeed, more and more women are keen to join the ranks, even as they do not need to serve mandatory national service in Singapore. The enthusiasm of girls to join the military is due also to the privileges accorded to national servicemen, especially in terms of opportunities and life chances. Therefore, for example, this year's SAF scholarship recipients include three female (out of thirteen) for the SAF Merit Scholarship and six (out of seven) for the Defence Merit Scholarships (Ang "NSF Hero Among 13"); and for the first time, a woman is awarded the Singapore Armed Forces Overseas Scholarship, which is the second most prestigious scholarship in the nation (Chow "First Woman to Bag Top SAF Scholarship"). These developments signal a clear and inevitable co-option of women into the service. Although the introduction of new technologies in battlefields have opened the door for more women participation in the military, critical feminists argue that women's participation in the military signal less their empowerment and more the larger militarisation of society. This is because women's presence in the military has done little to re-define militarised conceptions of citizenship (based on one's capacity to fight for one's country) and the military's masculine values and power structures. In fact, critical feminists point out, women's participation help legitimise the military under an egalitarian facade while leaving the gendered (and racialised) militarisation process intact (D'amico 120-122; Turpin 10; Klein 126). Moreover, when a large section of society becomes tied directly or indirectly to the military as means of subsistence, employment, research, education and skills training, "civilian rule then legitimises military rule" (Regan 11).

potential attacks. After all, as Virilio recalls “terrorism is intimately connected with technologization” (Virilio and Lotringer 123).

Therefore, Choy et al.’s turn to DARPA as the solution for U.S. failure (in the first monograph), paradoxically, fails to consider DARPA and technocracy as part of the problem of the superpower with billions to spend on defence. Moreover, despite their ironic point that the proliferation and appropriation of increasingly powerful technologies is underlining the asymmetry of power, there is continued push to use and produce sophisticated technologies in 3G SAF and the iN2015 Masterplan. Such moves, as expected, will fuel more frightening types of techno-war, such as chemical or biological warfare, as weaker nations or groups seek out cheaper alternatives as a response to stronger overdeveloped foes (Kellner 234). This failure by Choy et al. to see the solution as the source of the problem and to use the problem as the solution is mirrored in the general populace. As civilians become targets of defence and for attacks, what seems to be missed, paradoxically, is that the enthusiasm around “Total Defence” and its technologies is also the cause for more defence and security.

5.4 The Paradoxical and the Reversible: Some Concluding Thoughts

This chapter has teased out, through 3G SAF and the iN2015 Masterplan, the circular and mutually constitutive relationship between science, technology, the military and industry. I demonstrated how the intimate and reversible links between the iN2015 Masterplan and the 3G SAF, in terms of their infrastructural and manpower needs, as well as converging interests and objectives, are facilitated by the reversibility of technologies and technical knowledge in the larger militarisation of Singapore society and the circulation of elites. However, in this circulation of elites, it seems that the

military itself, ironically, is not spared of the feeling of insecurity under the logic of deterrence the Singapore populace is subjected to.

Returning to the 3G SAF discourse, in the latest monograph on 3G SAF, entitled "Integrated Knowledge-based Command and Control for One SAF: Building the 3rd Spiral, 3rd Generation SAF" (1-78), Chen et al. draw up a number of failed examples from business history to argue for the need to "constantly evolve or reinvent oneself to remain relevant and competitive" (1). This is a "truism" they stress, even for the military, except that "the stakes are much higher" in the military domain, where its failure means hardship for the homeland and its citizens (Chen et al.1). The authors reiterate that "a defence entrepreneur spirit must continue to be nurtured as advocated in the C2C monograph to bring about changes in thinking and innovative application of technologies that are integral to realising new IKC2 warfighting concepts" (Chen et al. 3). They state that the purpose of their monograph is to "elicit thoughts and challenge prevailing mindsets," by looking into "the future to shape the present waypoints" (Chen et al. 3). They then proceed to rehash most of the points made in the first two monographs, but supplementing these with "emerging trends that offer new opportunities and paradigms of thinking about operations" (Chen et al. 3).

The current realisation of 3G SAF, as with the iN2015 Masterplan, is driven by a technocracy that has been building up since the founding of the city-state, marked by a capitalist neo-liberal rationality and a blind faith in C^4ISTAR technologies and technicity. In its current attraction to Artificial Intelligence's promise of substituting technology for people, through "intelligent" technology and "smart weapons" (Athanasiou 236), these technologies are looked to by both 3G SAF and the iN2015 Masterplan as the ultimate solution to a whole host of problems. This

is despite the fact that the predictions of Artificial Intelligence have always relied on ideological commitment to high technology, rather than on the actual science, and that its research and development is subjected to the interlocking networks of economic, political and military interests and ideologies (Athanasiou 239-245). Ironically, Chen et al. argue "the stakes are much higher" in the military domain; yet, the converging interests of politics and business with the military, run the risk of subjugating prudence under the dynamics of power and money.

The success of Singapore's defence industries that is now part of the driving force behind 3G SAF's transformation and the iN2015 Masterplan is putting Singapore's populace and the region at risk with its aggressive arms production in the name of "national security." Since "the search for national security… usually ends up securing greater insecurity due to the actions they provoke earlier," this creates a spiralling and destabilising effect for all (Singh, *The Challenge of Conventional Arms* 85). As Choy et. al (in the first monograph) ironically point out, with globalisation, localised problems have significant effects. The insistence on producing and consuming C^4ISTAR technologies, with all their limitations and integral accident, has serious implications beyond the confines of the military and Singapore. More fundamentally, this insistence on the intensified proliferation, production and consumption of C^4ISTAR technologies and technicity will influence the very core of beings and of being.

The escape into informational space or "Integral Reality," Baudrillard contends, where everything becomes real, visible, transparent, and must come to fruition, all events, singularity and imaginary gets excised (*The Intelligence of Evil* 17-18). Hence, the erasure of events, enemies and death (in the insistence of "zero-casualties") are all part of "Integral Reality" and the obsession with security, law and

order (Baudrillard, *The Intelligence of Evil* 119). In this quest to overcome ambiguity, this escape to the virtual also "absorbs us and absolves us of any personal responsibility" (Baudrillard, *The Intelligence of Evil* 90). Crucially, the current attraction to Artificial Intelligence, with its infinite "intelligence," as opposed to thought that is finite, will create a situation where "the more intelligent beings there are (and, by the grace of information technology, they are virtually all intelligent), the rarer thought will be" (Baudrillard, *The Intelligence of Evil* 181). Baudrillard reminds us, "The world is not intelligent, but thought has nothing to do with intelligence. The world is not what we think, it is what thinks us in return" (*The Intelligence of Evil* 182).

Chapter Six:

What Next for Singapore? Building Towards the Fatal…

> "All events described here are susceptible to two kinds of diagnosis: physical and metaphysical" (Jean Baudrillard, *The Transparency of Evil* 100)

This dissertation has shown that the iN2015 Masterplan and pervasive computing cannot be seen and understood in isolation. They shape each other through their discourse and both, in turn, are shaped by and shape their contexts. Chapters two and four showed that the notion of technological "empowerment" in wearable computing and ubiquitous computing are closely tied to the neo-liberal political economy and cybernetic techniques that are themselves products of a historical mix of techniques and technicity. These include liberal trade and its utopian views of networks or the global city, underpinned by the desire for one system, language or code, as well as Enlightenment notions of "progress" that tie "progress" narrowly to work and technological development. They also entail the total war strategies of "empowering" the peripheries in order to enhance the core, and Cold War tactics of decentralisation, persuasion and disorientation, as well as its practice of technical forecasting.

The neo-liberal values and Cold War techniques and technicity embodied in pervasive computing, consequently, also influence Singapore, its iN2015 Masterplan and 3G SAF. This is because of Singapore's embrace of Cold War technologies and technicity that have intensified under its current ambition to be "an intelligent nation, a global city, powered by infocomm" (IDA, "iN2015 Masterplan" n.p.). In particular, pervasive computing's vision of seamless integration, connectivity, constant and pervasive control and machine "intelligence" is repeated in the discourse of the

iN2015 Masterplan and the 3G SAF. Likewise, their production of active technological subjects needed for the perpetuation of their projects, through the rhetoric of empowerment, control and inclusion, is mirrored in the iN2015 Masterplan and the 3G SAF's valorisation of active technological entrepreneurs or network warriors, highlighted in chapters three and five. Here, the synchronicity of discourse results from the synchronicity of the technologies shaping discourse. Therefore, technology and discourse are in synch in terms of their embodiment of neo-liberal values and rationality, as well as how they structure thoughts through their techniques and technicity. Both rely on the consumption of their codes in order to sustain and perpetuate their structures. Finally, both discourse and technology operate on the production of "blindness," making themselves and their dual structures invisible. In short, discourse and technology speak as one, just as their environment speaks them. Hence, wearable computing, ubiquitous computing, the iN2015 Masterplan and the 3G SAF are parts of and add up to what Baudrillard describes as "Integral Reality," highlighted in the previous chapter.

Within "Integral Reality," the forces of globalisation, virtualisation and the moral-political economy make "liberation" a moral duty for subjects, and present it as achievable only via immersion in screens, networks, and technologies of Virtual Reality (Baudrillard, *The Intelligence of Evil* 50-55). Here, the machines' limitless possibility of functioning entices (80) and is presented to subjects as the source of their "empowerment," when in fact the production and consumption of codes is what sustains "Integral Reality." In this process, simulated difference is produced and consumed – as I highlighted in chapters three and four, between "East" and "West," the "individual" and the "collective," "men" and "women" – when subjects are really engaging with the programme, with virtuality and its code, rather than with an Other.

In this incessant production and consumption of information, the forces of globalisation, virtualisation and the moral-political economy reach the highest stage of reality, where information goes into over-drive as with the logic of abstraction (general equivalence), simulation and circulation (Baudrillard, *The Intelligence of Evil* 48). As a result, the image and reality are destroyed, not in their actual eradication, but in the loss of their symbolic value due to the over-production of meaning. This then leads to indifference, banality and ineffectual politics, as in the case of certain cyber-feminist politics, pointed out in chapter two.

At the same time, as chapter three showed, most subjects willingly enter the electronic circuits under its logic of participation (interaction and circulation). The "ecstasy of communication," Baudrillard highlights, is that there is "no 'Other'" (*The Intelligence of Evil* 81). Instead, the subjects' disappearance into the networks, require them becoming their own terminals, coder and decoder, and their being one with the machine (80-81). Here, the enticement of the subjects into the networks is facilitated by the electronic circuits' ability to absorb and absolve them from responsibilities. This is best demonstrated by the way people and bodies are easily dissimulated by new media technologies as in the erasure of the foreign workers and foreign domestic workers, and civilian casualties, pointed out in chapters three and five. This disappearance of bodies and ultimately death is *not* without consequence. Virilio points out, "the gravest danger in post-monarchic society is the concealment of death" since "the consciousness of death is the origin of consciousness" (Virilio and Lotringer 133-134). He adds that to forget death is to forget that we are mortals, which today is increasingly obscured by the objectives of science and technology (Virilio and Lotringer 134).

This paradox of over production of images and simultaneous dissimulation of death and the Other is fundamental to the military logic of persuasion and disorientation, tied to its logistics of military perception and production of "blindness," discussed in chapters one and two. In fact, "Integral Reality" and its demand for transparency and visibility, where everything has to have a meaning, come to fruition, and where all imaginaries and events are arrested and/or require constant policing, is very much a part of the military logic of deterrence. This obsession with security, with law and order, and therefore, with control, is also embodied in post-Cold War technologies and technicity. Singapore's "natural progression" from a developing nation to a modern city-state and now its current desire to be a global city and "intelligent" nation are evidence of the spiralling techniques and technicity that come with its embrace of Cold War technologies and technicity. The desires embodied in the iN2015 Masterplan and the 3G SAF reflect an intensified technocracy, an effect of "Integral Reality" that is already structuring subjects under its logic. In other words, the iN2015 Masterplan's desire to integrate all aspects of everyday life through information technologies and telecommunications, and the 3G SAF's integration of all forces into one network-centric fighting force, are part of "Integral Reality' and its propensity to abolish distance everywhere (Baudrillard, *The Intelligence of Evil* 75), just as information removes the distance between humans and things under its logic of immediacy (Baudrillard, *Passwords* 27-28).

Additionally, both the iN2015 Masterplan's and 3G SAF's determination to overcome ambiguities are effects of "Integral Reality" and its promise of certainty, visibility, transparency, and the logic of control underpinning information technologies and telecommunications. In fact, "Integral Reality" tries to cancel and

suppress all events and singularities, including its own integral accident, as highlighted in chapter five. Under the C^4ISTAR logic of control, abetted by the rhetoric of control of technology, human thought and actions, paradoxically, are determined by the demands of the technology, where human control, intentions and responsibilities are eventually taken out of the cybernetic loop, stipulated by the speed of the technology. Simultaneous to the purging of human thought is the embrace of Artificial Intelligence, which according to Baudrillard is the "highest stage of intelligence" – integral, limitless, asexual, fractal, but above all, "never opposed to itself … an absolute progress" (*The Intelligence of Evil* 178). Artificial Intelligence, based on the "zero degree of thought," sees itself as "purged of all stupidity" (*The Intelligence of Evil* 178-179). It is what, ultimately, the iN2015 Masterplan and the 3G SAF are modelled after, in their purging of radical singular thought, as demonstrated by Lieutenant Ng's case, and in their production of One and the Same technological subjects.

Singapore's building towards "Integral Reality" and, thus, its integral accident, not only risk its own demise, but also repercussions beyond its shores. Yet, its only saving grace – radical singular thought – is increasingly threatened by the city-state's proliferation and intensification of artificiality, both through material construction of technologised spaces and through ideological production of active technological subjects. Therefore, it is imperative to return to Baudrillard's point, highlighted in the beginning of this dissertation, that our created environment is what thinks us, and that it is the "created object which thinks us … better than we do and quicker than we do: which thinks us before we have thought it" (*The Transparency of Evil* 42). This is a reminder for us to be aware of the artificiality of our own conditions that result from an artificial environment created by ourselves. This artificial environment based on

"intelligence," works through abstraction and not the social. It is adept at producing "difference" for consumption that adds very little to our understanding of caring and sparing. In fact, its twin strategy of dissimulating death and the Other, as well as its over-production of images robbed of their symbolic value, only creates indifference and encourages a circulation of responsibility. Meanwhile, the incessant integration and control or the hyper-integration and over-management of Singapore can only lead to the catastrophic collapse of its system and defence, much like the over-protected body that loses its defence (Baudrillard, *The Transparency of Evil* 62). This is the inevitable result of Singapore's build up to the fatal, to the principle of Evil.

The principle of Evil is inherent to the dual structure or reversibility of "Integral Reality." Baudrillard points to this reversibility as the "*theorem of the accursed share*," that is, the "*inseparability of good and evil*, and hence the impossibility of mobilizing the one without the other" (Baudrillard, *The Transparency of Evil* 105). This reversibility is something "Integral Reality" cannot escape from, even as it tries relentlessly to police and suppress all events, because this reversibility is inherent to its form (Baudrillard, *The Transparency of Evil* 159). The principle of Evil is antithetical to the repressed; it is not desire but indifference (Baudrillard, "Fatal Strategies" 202). It is, at the same time, opposite to the accidental, which is peripheral to the system, whereas the fatal is immanent to it. Baudrillard elaborates:

> An outcome is fatal when the same sign presides over both the advent of something and its demise, when the same star that gave hope leads eventually to disaster, or (as in the case of computer viruses) when the logic that informs a system's expansion then proceeds to devastate it. The fatal in this sense is the opposite of the accidental. The accidental

> is peripheral to a system, whereas fatality is immanent. (*The Transparency of Evil* 40)

The fatal is the metaphysical aspect of the system that cannot be ignored or controlled for every attempt to over-manage and hyper-integrate will lead to an excess. Hence, Baudrillard argues:

> The excess of health engenders viruses and virulence. The excess of security produces a new threat, that of immune system failure. The excess of capital engenders speculation and financial collapse. The excess of information engenders undecidability of facts and confusion of minds. The excess of reason engenders the unjustifiable. The excess of transparency engenders terror. (*The Intelligence of Evil* 192-193)

What this means then is that as integration increases and the spaces for manoeuvring diminish, vulnerability increases, which, in turn, demands more integration, control and policing, in a generalised cycle. The turn to C^4ISTAR technologies, the cause of the problems as the solution for more control is an effect of the technologies' technicity, as well as a disavowal of the structure's own inherent limitations and reversibility; a paradox of the Virtual that denies its own reality (Baudrillard, *The Intelligence of Evil* 83). Yet, precisely because of the increase in integration and the resulting need for movement and spaces for manoeuvring; resistance and frictions are always inherent in attempts at totalisation. After all, the *Smart Apron* is proof of this. However, the key here is to recognise that these resistance and frictions can also be simulated. This is no doubt a difficult challenge,

and my dissertation is an attempt to come to grips with this, through radical singular thought – thought's ability to decentre, to recognise its own fallacy, to acknowledge that it is the created object which thinks it, and to resist the drive for its completion.

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