CYBORG ONTOLOGY AND POLITICS
IN *INTELLIGENT NATION* SINGAPORE

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SUMMARY

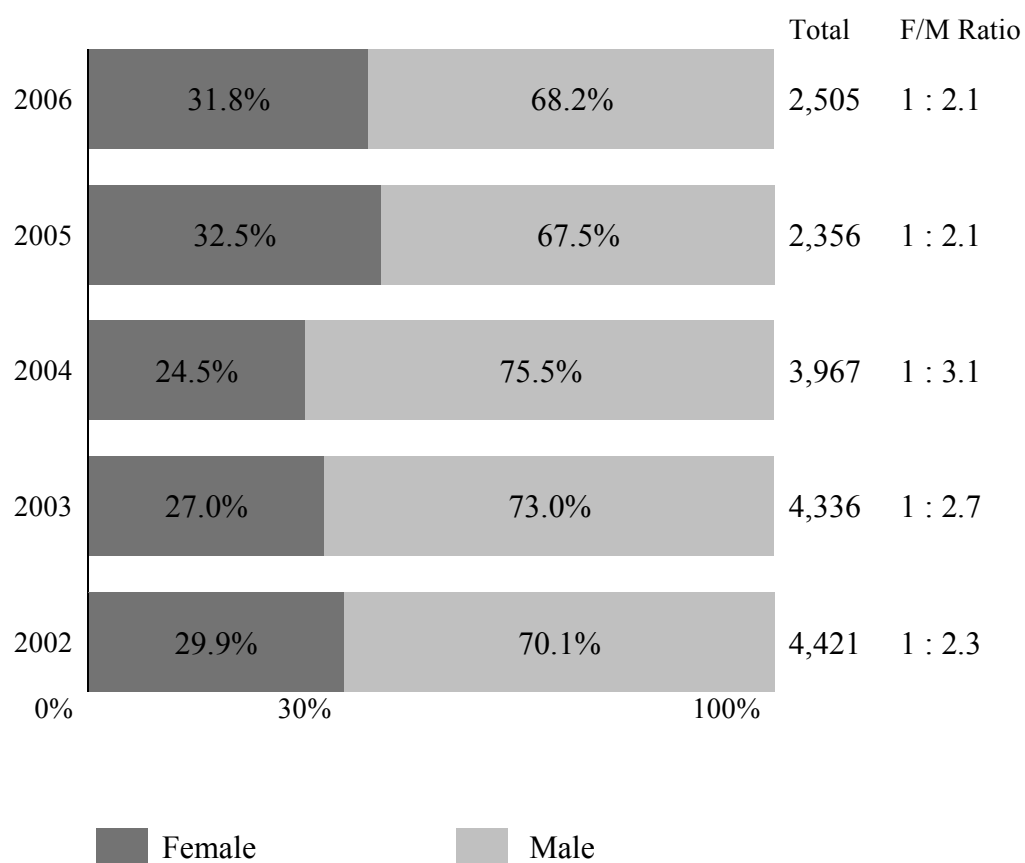## Cyborg ontology and politics in *intelligent nation* Singapore

With its history inextricably linked with technology since independence, Singapore makes an excellent study of the cyborg phenomenon. The cyborg, which describes a cybernetic organism that is a hybrid of machine and organism, originally referred to an enhanced human being who could survive in extreme environments. Transforming Singapore into an intelligent nation has become a nationalist project as well as a personal responsibility for its people. While ICT policies promote the inevitable cyborgian path for Singapore's future, there are concerns and issues that could be unravelling their intended outcomes. The 'Intelligent Nation 2015' master plan, or iN2015, Singapore's latest ICT policy, markets the promise of empowerment in a digital future for everyone; a rhetoric clearly shifting from one of survival and crisis management to that of technotopia. The thesis argues that cyborgisation under iN2015 is driven by the technologically possible and desirable with consequences that are contradictory to its aspirations of a digital future that is empowering for all. Employing Donna Haraway's "A Cyborg Manifesto", the thesis hopes to uncover the ontology and politics of new technology adopted by iN2015 that is speeding up the cyborgisation process in *intelligent nation* Singapore.

Haraway's cyborg is both oppositional and utopian; it holds promises and hopes, as well as dangers and threats. While iN2015 sees the cyborg as a technologically enhanced state that is desirable, Haraway's cyborg in contrast provides a platform for examining the productive tensions and possibilities between the technological and the organic in our relationship to new technology. Paul Virilio's chronopolitics drawn from his study of speed in history called dromology will be discussed for its relevance on how speed has become the main driver of technological innovation and a source of capital and power. Gillian Youngs' political economy approach has also been enlisted to provide an insight into areas affected by new technology, particularly, on power and inequality.

The iN2015 vision will be closely examined to uncover what cyborg body/bodies are being produced in *intelligent nation* Singapore, and how they relate to social reality defined as lived social relations. The cyborg future in 2015 necessitates a form of technological citizenship that obliges citizens to be technologically knowledgeable to the extent of being mainly media savvy users and consumers of new technology. The iN2015 cyborg ends up being one-dimensional, its promise of empowerment driven mainly by consumption, while living a life in technicity addicted to speed, constant innovation, and the hyperreal. Finally, if new technology is more fraught with the politics of growing inequalities, how can we employ the cyborg itself to rethink a different ontology and politics in dealing with new technology? These are all urgent questions for our contemporary times mediated by new technology and will be discussed closely in relation to the iN2015 master plan.

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Chart 1: Enrolment in Universities for Computing/Information Technology

	Female	Male	Total	F/M Ratio
2006	31.8%	68.2%	2,505	1 : 2.1
2005	32.5%	67.5%	2,356	1 : 2.1
2004	24.5%	75.5%	3,967	1 : 3.1
2003	27.0%	73.0%	4,336	1 : 2.7
2002	29.9%	70.1%	4,421	1 : 2.3

0%   30%   100%

■ Female   ■ Male

Source: Ministry of Education

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Chart 2: Total Employed Infocomm Manpower by Gender

Year	Female	Male	Total	F/M Ratio
2008	30%	70%	139,000	1 : 2.3
2007	30%	70%	130,400	1 : 2.3
2006	30%	70%	119,700	1 : 2.3
2005	33%	67%	111,400	1 2.0
2004	32%	68%	108,000	1 : 2.1
2003	32%	68%	104,300	1 : 2.1
2002	33%	67%	103,900	1 : 2.0
2001	33%	67%	102,100	1 : 2.0
2000	34%	66%	105,600	1 : 1.9

0%   30%   100%

Female   Male
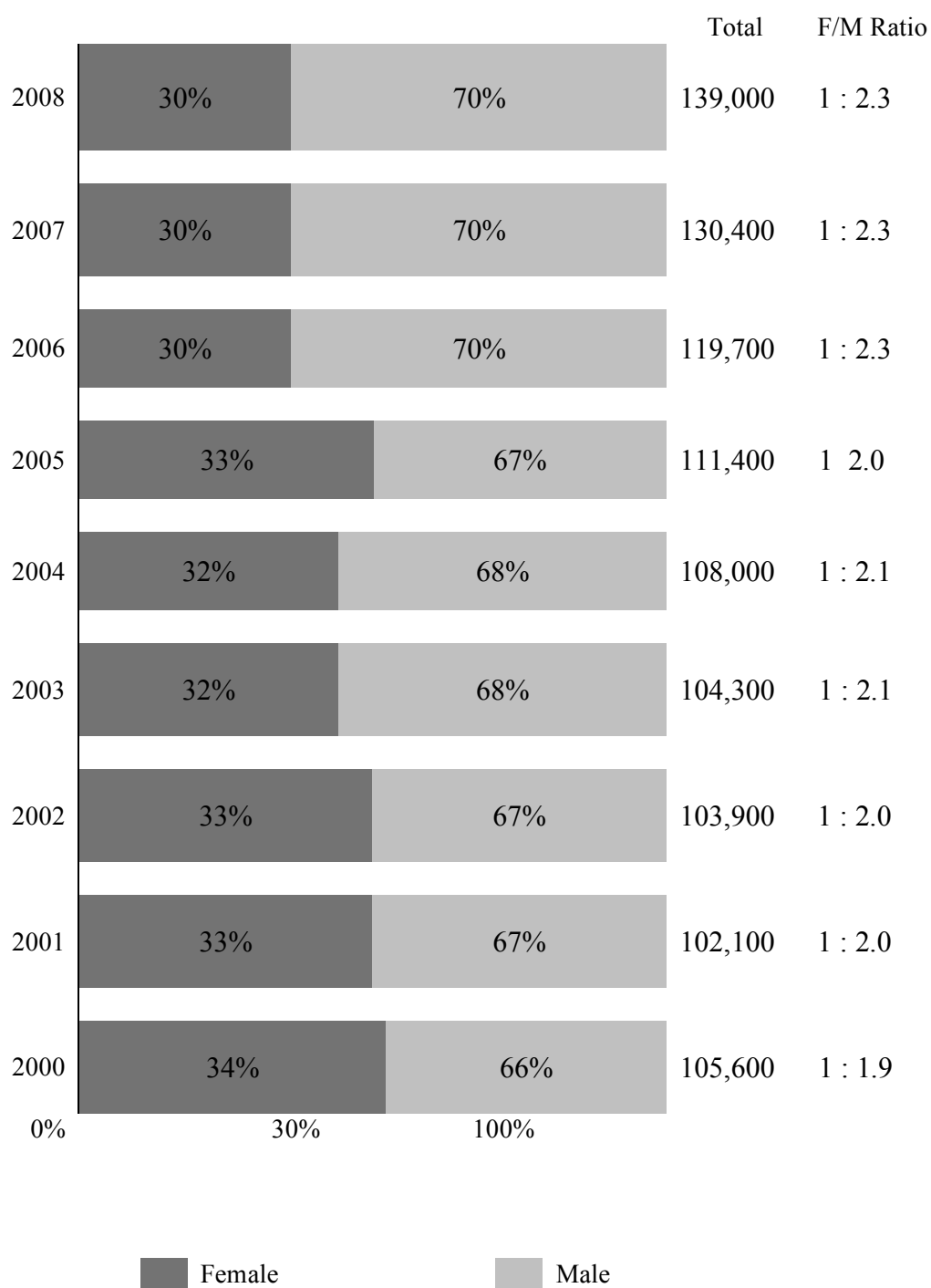
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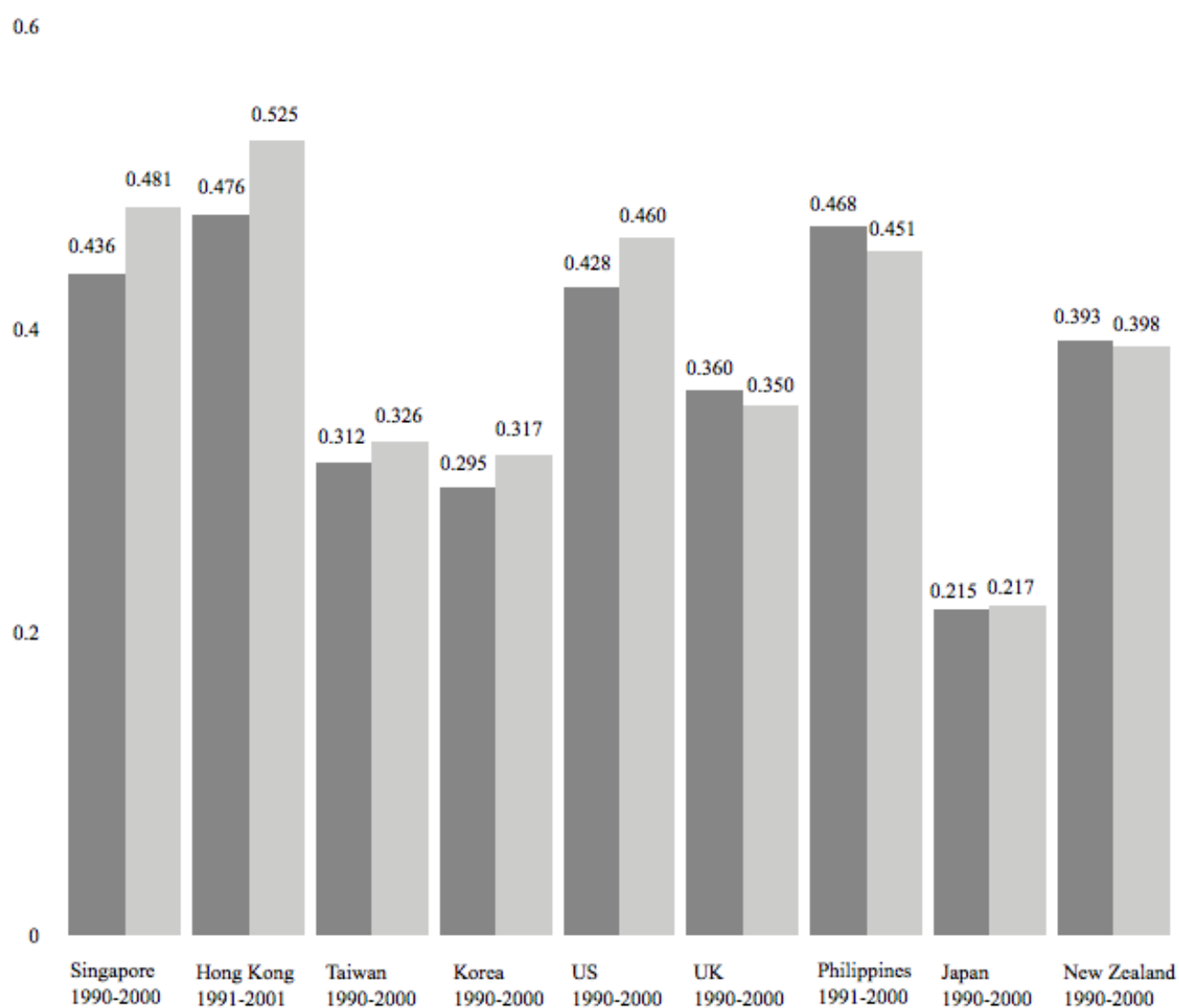
Source: Singapore Department of Statistics, 2002

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Table 1: Measurement of Household Income Disparity

Year	1990	1995	1997	1998	1999	2000
Gini Coefficient	0.436	0.443	0.444	0.446	0.467	0.481
Ratio of Ave Income						
Top 10% to lowest 10%	26.1	-	-	-	-	275.5
Top 20% to lowest 20%	11.4	13.8	13.6	14.6	17.9	20.9
9th decile to 2nd decile	5.5	6.1	5.9	6.2	6.8	7.4
Income shares						
Lowest 20%	4.2	3.5	3.6	3.3	2.8	2.4
Middle 60%	47.6	48.5	48.3	48.5	47.4	46.6
Top 20%	48.1	48.0	48.2	48.2	49.8	51.0

Table 2: Gini Coefficient Among Employed Households/Ratio of Ave Income

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
A	0.444	0.456	0.457	0.460	0.464	0.470	0.476	0.489	0.481
B	0.431	0.434	0.433	0.449	0.454	0.459	0.455	0.479	0.462
Ratio of Ave									
Top 20% to Lowest 20%	10.1	11.1	11.3	11.5	11.7	12.3	12.4	13.2	13.0

A is Gini coefficient based on Original Income from Work per Household Member
B is Gini coefficient based on Household Income from Work per Household Member after accounting for Government Benefits and Taxes

Source: Singapore Department of Statistics, 2002

Introduction

Singapore the cyborg state: concerns and issues

With its history inextricably linked with technology since independence in 1965, Singapore makes an excellent study of the cyborg phenomenon. A cyborg, an abbreviation of cybernetic organism, refers to a technologically enhanced human being who could survive in extreme environments. The thesis proposes that the cyborg description appropriately summarises Singapore's technologically enhanced state. A mere red dot of an island without natural resources and not even self-sufficient in water, Singapore has had to turn to wastewater (sewage) and desalination as new sources of water. Sitting in a sea surrounded by what the state often alludes to as unpredictable neighbours, Singapore has built up the most sophisticated military hardware in the region while conscription is mandatory for all male citizens. Finally, technology has always been Singapore's lynchpin for economic survival. Alwyn Lim observes that "to write a history of the development of Singapore is to also to write a history of technology in Singapore" ("The Culture of Technology of Singapore" 42). Singapore has been marshalling its cyborg existence with five national information technology (IT) plans in the last three decades of its 44-year history; the latest being the 10-year master plan adopted in June 2006 called Intelligent Nation 2015 (abbreviated as iN2105). While the cyborgian path seems inevitable, even essential, for Singapore, there are concerns and issues relating to Singapore as a cyborg state and its cyborgisation process that could be unravelling their intended outcomes. The thesis argues that cyborgisation under iN2015 is driven mainly by the technologically possible and desirable, with consequences that are contradictory to its aspirations of a digital future that is empowering for all. The thesis also asserts that iN2015 produces cyborgs as one-dimensional, which is essentially consumptive, while

living a life in technicity, described as a hypermodern techno lifestyle, one that is

addicted to speed, innovation and the hyperreal. Before the thesis deals with these

concerns and issues of Singapore's cyborgisation under iN2015, the term, cyborg, needs

to be clarified for three reasons: one, to contextualise its meaning in relation to

technology and tools that have marked human history; two, to explain why it has been

mobilised to deal with Singapore's tryst with technology; and three, how the term and its

associated words will be used in the thesis.

1   Have we not always been cyborgs?

The term, cyborg, has been mainly attributed to Manfred Clynes and Nathan Kline

who used it in 1960 in their space travel research to modify the human body so that it can

adapt and survive in extraterrestrial environments (29-33). During this Cold War period

of space exploration, the United States was anxiously competing with the Soviet Union,

especially after the Russians, ahead of America, launched the Sputnik, a satellite in outer

space. Clynes, a scientist and musician, and Kline, a psychiatrist, were invited by the US

Air Force School of Aviation Medicine to present a paper on ways to surmount the

biological problems in space travel at the Psycho-physiological Aspects of Space Flight

Symposium. In their paper, "Cyborgs and Space", the cyborg would be an "exogenously

extended organizational complex functioning as an integrated homeostatic system

unconsciously" (30). To understand this original meaning of cyborg, it helps to

understand another term *cybernetics*, from which the first syllable forms part of its word.

Cybernetics[1] is a study of the structure of the regulatory systems (digital, mechanical or

biological) that process information, react to information, and change or can be changed,

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[1] Norbert Wiener defined cybernetics in his book of the same title as the study of control and
communication in the animal and the machine.

to better achieve their tasks. It stems from the Greek word *kybernetes*, which means steersman, governor, pilot or rudder, having the same root as government. Hence, cybernetics looks at the design and function of any system, both physical and social, and includes the purpose of making the system more efficient and effective. Enhancing the cyborgian condition in Clynes and Kline's proposed experiment are, therefore, exogenous or external agencies, biochemical, mechanical and/or electronic, which extend the self-regulatory control function of the organism beyond its usual limitations to enable its adaptation to new environments.

If a cyborg is a being improved or sustained in some way by an external agency, then there are certainly many cyborgs among us. Spectacles enhance our vision, we take drugs for our ailments, use prostheses, have pacemaker implants, wear hearing aids, and even our mobile phones make us cyborgs. Chris Hables Gray, Steve Mentor and Heidi J. Figueroa-Sarriera, editors of *The Cyborg Handbook*, raise the pertinent question: "haven't people always been cyborgs?" (6). The range of human-machine couplings, according to Gray et al., defies definition, "from the quadriplegic dependent on a vast array of high tech equipment to a small child with an immunization" (4). However, Gray et al. also highlight the great difference between a kidney patient on a dialysis machine and a combat pilot in his fighter aircraft; the patient uses technologies to maintain normal bodily functioning while the pilot cyborg is an enhanced being, "a man-plus" (4). These two cyborg examples show there can be different kinds of cyborg bodies, and different dimensions of cyborgisation depending on the purpose of the technological enhancements. Coming back to the question, have we not always been cyborgs, according to Gray et al., the answer is a definite no. They argue we believe we have been cyborgs only because of hindsight, stating that: "Cyborgian elements of previous human-tool and human-machine relationships are only visible from our current point of view" (6). I

concur with this argument because history shows us humans have always been tool bearers and, therefore, were technological from the very beginning. The cyborg developed, thus, from these human-tool and human-machine relationships, but it now represents a "fundamentally new stage" because "in terms of quantity and quality, the relationship is new" (Gray et al., 6). I will now discuss what this fundamentally new stage means.

One new aspect of the human-machine coupling of the cyborg is the kind of machines that are making us cyborgs. These are the new technologies of information and communications (abbreviated as ICT for singular and ICTs for plural) that have transformed our worlds dramatically in the last two decades. Three objects have been fundamentally responsible for the dramatic changes–the computer, the telephone and Internet. We can telecommunicate across time zones with multiple persons, watch a live feed of a war conflict happening real time in some remote part of the world, engage in emotional relationships in virtual realms that also trade in real money, and play a video game online simultaneously with thousands of gamers globally. The new technologies are compressing our experience of time and space, and even affecting our perception of reality. Another aspect of the new stage of the present-day cyborg or cyborg phenomenon is that ICTs are so thoroughly integrated into everyday objects–described as ubiquitous or pervasive computing-that we have become unaware of their presence, or that we are engaging with them in our everyday activities. In this regard, it is difficult to escape cyborgisation in a modern city like Singapore where most everyday activities have become computerised and automated with the use of ICTs. To show the extent of cyborgisation of modern societies today, Gray et al. identified four main sources of cyborgian technologies: their strong military origins, civilian medical research, the entertainment industry (the examples they give are print, film, games and action figures),

and finally, the work arena, particularly, the computer industry but most definitely, in "the cybernetization of all industry" (3). So, while we may not be cyborgs ourselves, we most certainly live in a cyborg society.

The final feature of the cyborg phenomenon relates to a kind of ontological anxiety. According to Jennifer Gonzalez, the cyborg has recurred historically, "at moments of radical social and cultural change […] When the current ontological model of human being does not fit a new paradigm, a hybrid model of existence is required to encompass new complex and contradictory lived experience" (61). The cyborg, as Gonzalez elaborates, becomes "a historical record of changes that affect our understanding of what it means to be human" (61). And what it means to be human is necessarily a dynamic process related to 'being', the subject of ontology itself.[2] The term, human *being*, in fact, should remind us that its ontological status cannot be fixed in its meaning, but continually negotiated on an individual and even societal level, especially with the onslaught of technology in contemporary times. Thus, the stories we tell about cyborgs, whether it is Frankenstein's monster or Arnold Schwarzenegger's Terminator, are "attempts to understand the broader implications of human/machine co-evolution" on an ontological level (Gray et al. 6). One dominant theme in the stories about cyborgs is whether machines have taken over humans in our machine-dominated culture where human control is progressively being eclipsed with increased automation. In this human/machine co-evolution, science fiction has led the way imagining and re-imagining cyborgian technologies as well as reconfiguring cyborg bodies, often ambiguously, to suggest some of the ontological conundrums and ethical implications that the new

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[2] Ontology, which comes from the Greek words ὄν meaning "to be" or being and *-logia* meaning science, study, theory, is the philosophical study of the nature of being, existence or reality in general, as well as the basic categories of being and their relations (taken from Wikipedia).

technologies represent and posed by the discursive term, posthuman[3]. With this human/machine co-evolution, I would like to highlight a signifier of the cyborg, which is, that it is "always located in a body" (Balsamo 152). This 'body' signifier is a necessary reminder of the organicity of the cyborg and how this relates to *being* human, a body that has a mind. In assessing the kind of cyborgs being produced under iN2015, the thesis is interested in the concerns and issues of the cyborgisation process at this ontological level, as well as its political implications and consequences. However, it has to be stated at the onset that the term, cyborg, and all its associated words, are not adopted in the iN2015 document. Why the term, cyborg, is used in analysing iN2015, Singapore's latest ICT policy, needs explanation. To do this, we turn now to the iN2015 report and its accompanying infocomm technology roadmap.

2   iN2015 and its technology roadmap

Singapore's first IT plan was rolled out in 1981 targeted at the computerisation of the public sector, while the second 1985 National IT plan focused on the private sector to improve business productivity. The third, IT2000, launched a vision of an intelligent island where IT continued to be emphasised for improving national competitiveness, but now becoming promoted as a way to enhance the quality of life for the population at home, work, and play. The transition to the 'intelligent island' rhetoric was presented as a "historical necessity", essential and inevitable for Singapore's basic existence, and as "trans-national and global in nature, relying on a mode of economy largely determined by international flows of knowledge, skills and technology" (Lim, "The Culture of Technology of Singapore" 51). In this rhetoric of crisis and survival, Lim argues,

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[3] The term, posthuman, has several interpretations being associated with science fiction, futurology, contemporary art, and philosophy, but a discussion on its discursive term will not be within the scope of the thesis.

technology became a galvanising strategy in nation building negotiating a national

identity based on creating a "specifically national high-technology environment"

("Intelligent Island Discourse" 179). The fourth plan, called ICT21 and announced in

2000, reinforced the intelligent island rhetoric to transform Singapore to a knowledge-

based economy. It has since been succeeded by the fifth and the latest Intelligent Nation

2015 master plan, or iN2015, which was announced in 2006. The deliberate change from

'intelligent island' to 'intelligent nation' signals the continuation of the "nationalist

project", as described by Lim, whereby embracing new technology is demanded of its

citizens not just as a national but also a personal responsibility ("Culture of Technology"

51).

The iN2015 master plan, with its slogan of "An Intelligent Nation, a Global City

Powered by Infocomm", intensifies the cyborgisation of Singapore with new technology

reaching unprecedented levels of ubiquity. As Singapore's latest ICT policy, iN2015 is

the most ambitious strategic plan covering ten years compared to all previous 5-year

plans. Its marketing rhetoric has shifted noticeably from the message of survival and

crisis management to one of empowerment in a digital future for everyone. To probe this

iN2015 vision of empowerment, the thesis will examine two documents. The first is the

ICT policy document by the iN2015 steering committee titled "Innovation. Integration.

Internationalisation." referred to in the thesis as the iN2015 report, or just iN2015. The

second is the latest Infocomm Technology Roadmap report, the fifth so far, or ITR5,[4]

which is driving the iN2015 vision. Both are available online. Infocomm Development

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[4] Since 2000, IDA has issued five technology reports called infocomm technology roadmaps. This fifth formed the infocomm technology report framing the iN2015 vision, which was launched at the ITR5 Symposium in March 2005.

Authority of Singapore (IDA)[5], formed in 1999 with the mission of growing Singapore

into a global infocomm hub, is the government statutory board driving the iN2015 vision.

IDA's website also provides information for the iN2015 vision and mission. From its

website, iN2015 promises to give "every individual and endeavour seamless access to

intelligent technology – and with it – the capability to take charge," and this capability

has been described as "the new freedom to connect, innovate, personalise and create."[6] In

the report, iN2015 proudly heralds the concept of "Infocomm Unlimited" to drive

"limitless possibilities in our economy and society" […] "to help us become more

creative and to enjoy life" (34). The iN2015 report continues: "By removing the tedium of

routine work, for example, people will have more time to dream up the new and different"

(34).

In summary, iN2015 aims to transform lives and businesses, fuel competitive

enterprise, provide the infrastructure, and develop human capital, in ways that will be

benefit every individual, business, and organisation. The six goals taken verbatim from

the iN2015 report are: first, to be number one in the world in harnessing infocomm to add

value to the economy and society; second, to achieve a two-fold increase in valued added

of infocomm industry to S$26 billion; third, to achieve a three-fold increase in infocomm

export revenue to S$60 billion; fourth, to create 80,000 additional jobs; fifth, to achieve

90% of homes using broadband; and lastly, to have 100% computer ownership in homes

with school-going children. To achieve these goals, the iN2015 strategies tackle four

areas: firstly, to spearhead the transformation of key economic sectors, government and

society through more sophisticated and innovative use of infocomm; secondly, to

[5] IDA was formed from the merger of the National Computer Board (NCB) and Telecommunication Authority of Singapore. NCB, which worked under the Ministry of Finance, was responsible for all national IT plans prior to IDA setting up.

[6] Taken from the IDA home page on its website which carries a whole section on iN2015.

establish an ultra-high speed, pervasive, intelligent and trusted infocomm infrastructure; thirdly, to develop a globally competitive infocomm industry; and lastly, to develop an infocomm-savvy workforce and globally competitive infocomm manpower.

iN2015 is, thus, an economic blueprint with concrete goals set for the infocomm industry and its usage. But it is also a futurological policy document projective of desires for an idealised future that is driven by macro technology trends prescribed in a technology roadmap report framing iN2015's directions and agendas. This technology roadmap report, or ITR5, as it is officially referred to, is based on macro technology trends in three key areas anticipated to change Singapore's future dramatically. The three areas are sentient technologies, future communications technologies, and the computing revolutions infused with nano and biotechnology. Tapping these technological developments, ITR5 portrays the future in quite euphoric terms gleaned from the report's preface. The computing wave will see computers disappearing into the background, "embedded into the very fabric of our lives", moving "from the era of "power of a mainframe on every desktop" to "power of a mainframe on every person" (ITR5 Preface 1). The communications wave will see "all Internet Protocol optical transmission backbones bringing communities together in cyberspace where there is no restriction of distance or time" (ibid 1). Finally, the sentient wave will herald in a new eco-system with embedded sensors in powerful computing nodes and devices that can sense and interact with one another, creating smart sentient spaces or "a world of things that think" (ibid 2).

The ITR5 report is, basically, a summary of the latest technology developments and concepts, collated from on-going research and product development programmes by private and public organisations, other national technology roadmaps, as well as military roadmaps. The common thread in all these different domains of research lies in "themes alluding to living seamlessly and working productively in a smart or sentient space"

enabled by technologies from computing, communications, and distributed sensing and embedded systems (ITR5 Sentient Technologies 1). ITR5 cites current research by leading scientists and global corporations such as Intel (proactive computing), Internet's founding father Tim Berners-Lee (The Semantic Web), Xeroc Parc (calm computing), MIT (affective computing), Ericsson (the Internet of Things), Motorola (Intelligence Everywhere), and Philips (Ambient Intelligence). The tone of the report is distinctly upbeat and positive from its euphoric expectations of new technologies when it exclaims: "The applications and potential opportunities are virtually unlimited for sentient spaces, and only limited by our own imagination" (ibid 5). It is necessary to see what examples of smart sentient objects are coming our way to understand this euphoria in ITR5. They include: a home mirror connected to an online wardrobe shopping service; a garden glass table with online gaming; our toilet mirror screening animated cartoon as a 'live' guide, for example, to make brushing teeth an enjoyable task for kids; and a living room wall that acts as smart ambient screen display or which can be made 'alive' with painted temperature sensors. There are computing wearables being developed, such as the smart baby jacket to prevent sudden infant death syndrome, sensors woven into underwear garments to monitor the heart to warn of impending stroke symptoms, and smart sunglasses that host camera, microphone, wireless MEMs (micro-electronic mechanical systems). Virtual reality environments will be created outdoors. For example, a video projection in the park could tell stories about its historical and monumental past, or educate us on nature conservation. Mixed reality will mix the real and the virtual, such as reading Shakespeare's Hamlet and seeing a 3D character appearing on the book delivering a soliloquy, or seeing animals from exotic lands projected in our immediate environment and playing with them in their real physical space. To keep our bodies healthy, ITR5 talks about care phones to monitor wearer's diabetes, diet phones

containing sensors that can measure human-body fat, and beauty phones with massage functions and sensors to gauge skin humidity level. The expectant hopes expressed in these future technologies are revealed when ITR5 concludes that these new technologies might even stem Singapore's falling birth rate. By removing the "burden" on young homemakers, ITR5 states, "there is a possibility that these stressed individuals will consider having more babies to reverse the country's declining population" (Executive Summary 4).

As a futurological policy document, the iN2015 master plan based on ITR5's forecast of future technology would seem more like a projection of desires for a techno future rather than about realisable futures themselves. The technological future painted in iN2015 has almost the aura of science fiction with applications that are either superfluous such as the care phones and diet phones, or phantasmagorical such as the mixed reality scenario of playing with exotic animals in one's living room. Many research ideas are presented as if they were already realised and done deals, and the language used is deliberately seductive. If technology is intelligent or smart, then surely it will benefit every one and desired by all. What ITR5 represents is technotopia: a future made perfect by technology because technology can solve our problems and satisfy all our wants and needs. The meaning of 'intelligent' in the 2015 future, we learn, is none other than total seamless Internet connectivity in our environments and smart sentient spaces with effortless and proactive human-machine-Internet interfaces. The iN2015 vision and the ITR5 mission, thus, have concerns and issues for the cyborgisation of *intelligent nation* Singapore, which I would like now to address. iN2015, it was stated earlier, does not use the term, cyborg, and ITR5 makes one cursory reference to an article titled "Becoming Cyborgs" from the Computer Science Corporation's Leading Edge Forum (Sentient Technologies 13). The article tucked under the section examining the impact of sentient

technologies on individuals and society was summarily dismissed after a one-sentence quotation: "Computing, biotechnology and robotics can create a world in which humans may be a rare breed" (ibid 13). Without any commentary, ITR5 moved on to discuss the positive side of sentient technologies, lasting several pages long, and their impact on society and individuals. The omission of the word, cyborg, or any discussion of the complex and sometimes incongruous processes of cyborgisation of Singapore under its ICT policies, is problematic. It signifies the supreme confidence in a technotopia framing the techno future ahead for Singapore under the IN2105 plan. At this stage, I would need to clarify further how the term, cyborg, will be used in the thesis.

The term, cyborg, moves away from just being a mechanically enhanced being, to be associated more specifically with new technologies centred around ICTs. The thesis will be using this term in this context: that to be a cyborg or to be in a cyborg world will mean to be dependent on these new technologies in some way or other in our everyday lives. Following on, the term, cyborgisation, will refer to the introduction of these new technologies into a system for the purpose of enhancing its functioning, while the term, cyborgian technologies, will refer to new technologies or ICTs and used interchangeably with these two latter terms throughout the thesis. But, if we are not computer savvy or connected to the Internet ourselves, does that mean we are not cyborgs and, thus, can escape cyborgisation? After all, globally, there are more people without access to a computer than those with access, while billions still live without any basic telecommunication. How do these people fit into the global cyborg world? The thesis takes the position that cyborgisation today affects everyone, even for someone who is not a Internet user marked in this instance by their separation from access to new technologies. This cyborg future of iN2015 will be deconstructed to uncover hidden assumptions and contradictions, so that the concerns and issues underpinning the

cyborgisation of Singapore can be brought to the surface. The first would be the message of progress inherently linked with technology.

3   *Technology as an ideology of progress?*

In analysing the impact of technology in society, technology is often treated either as an exogenous and given factor, which is external to social processes or dynamics, or as an endogenous and constitutive factor, that is, internal to social process or dynamics (Talalay, Farrands and Tooze 2-3). When it is taken as exogenous, technology is largely viewed as instrumental to be appraised as a tool or as an object of policy. With this exogenous approach, technology becomes associated in its material form as objects to be used and applied, and its instrumental nature assessed mainly in terms of ends and means.[7] As an endogenous and constitutive factor, technology is understood "as being shaped by social forces at least as much as it shapes these forces" (ibid 3). According to Gillian Youngs, when technology is treated in the first approach as exogenous and instrumental in nature, it becomes reduced to the technological imperative, that is, as an evolutionary movement of technical progress or advancement ("Culture and the Technological Imperative" 32-33). For Youngs, this notion of the technological imperative is tautologically "a way of explaining and legitimising ideas of so-called progress," and technology becomes represented as "an ideology of progress" (ibid 33). Such an approach totally overlooks social context; that technologies are "introduced into

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[7] Most academic studies of Singapore's ICT policies have treated technology as an exogenous factor, that is, as a tool and object of policy, focusing on their goals and efficacies of implementation. Major examples are: Linda Low's detailed analysis of Singapore One (the precursor for the Next Generation National Broadband Network in the iN2015 plan) discusses the dichotomy of the hard techno-infrastructural and soft socioeconomic issues in a fully-fledged knowledge society; Choo Chun Wei appraisal of IT2000's vision of an intelligent island, questioning the technical and social contexts of intelligence; and Alwyn Lim's several survey of the domestication of technology in the developmental process behind Singapore's modernity, adopting a socio-historical survey and deliberating on the official rhetoric used of tropes like survival, crisis management, and more recently, utopianism.

existing sets of social relations and processes, and will impact on them and evolve as part of them in anticipated and unanticipated, constructed and serendipitous ways" (Youngs, "Global Political Economy" 3). Technology as an ideology of progress could be described as technological determinism, which sees technological change as an independent factor impacting society from outside of society. Donald Mackenzie and Judy Wajcman believe technological determinism is problematic because it provides a narrow and incomplete picture of technology (5). They explain why technological determinism must not be accepted as a theory of technology:

> The view that technology just changes, either following science or of its accord, promotes a passive attitude to technological change. It focuses our minds on how to adapt to technological change, not on how to shape it. It removes a vital aspect of how we live from the sphere of public discussion, choice and politics. (5)

I would describe the technotopia in the iN2015 vision as one subscribing to technological determinism premised on the rhetoric that technology promises a better tomorrow with all problems solvable with technology. Such is the ideology of technotopia, a frame of mind that constantly looks towards an idealised future, while often ignoring the socio-political and technological dimensions of current problems. Such a belief in technotopia ignores the fact that technology is inherently political in particularly two ways. Firstly, technologies can be invented or designed, consciously or unconsciously, to serve certain social options and close others, and secondly, certain technologies are by their very nature political in a specific way that is strongly compatible with particular kinds of political relationships (Winner 29, 33). Winner characterises political relationships as centralised or decentralised, egalitarian or inegalitarian, repressive or liberating. The example he gives is the supply of energy: nuclear power

would necessitate a techno-scientific-industrial-military elite to commission and maintain the system, compared to solar energy that allows for a more disaggregated and widely distributed management of the community's needs. In other words, technology embodies specific forms of power and authority that are embedded in the social and economic system, necessitating questions like how is power generated, owned, used and controlled. When technology is linked automatically with progress, we often do not see the 'power' exercised by technical objects or technical systems. Judy Wajcman argues this is not surprising because when technical systems are completely integrated into the social fabric, they become 'naturalised' disappearing into the landscape (40). In the techno future of iN2015, we would increasingly be oblivious to the presence of technology as we enter an era of seamless connectivity and interactivity.

Even if we accept that technology and progress are linked in some way, Leo Marx's rejoinder, "Progress towards what?" needs urgently to be asked of the cyborg future in iN2015 (3). The survival trope lurks in the iN2015 vision, which, as articulated in its goals, is also about thousands of jobs and billions of dollars of export revenue for Singapore. While the iN2015 goals are undeniably urgent for Singapore's economic future, the role of technology as an endogenous factor on its political economy needs to be investigated to reveal a proper study of key areas, such as power and inequality, the impact of change, and questions of empowerment and disempowerment in relation to technology. Such questioning of technology cannot but assume a critical stance towards technology. This may be seen "as anti-technology, as an attempt to impose upon technology rigid, negative, political controls" (MacKenzie and Wajcman 6). Such a stance, that is, to question technology, could be construed as querulous particularly in Singapore, when the relentless deployment of ICTs has proceeded in an environment where policy-making has been "unencumbered", robust parliamentary debate is lacking

and mass media is mostly "pro-PAP and pro-government"[8] (Mahizhnan and Yap 1755). Furthermore, the public has been accustomed to acquiescing in government rationale behind policy decisions, believing that a corrupt-free and uncapricious government governs Singapore, and which always has the public good at heart (ibid 1755). How can a critical and necessary appraisal on the cyborgisation of Singapore under iN2015 be framed that is not understood as anti-technology? The thesis will now suggest a critical framework that takes us back to the cyborg to provide us with a valuable tool to help with investigating iN2015.

4   Cyborg ontology and politics

The cyborg myth has emerged in our machine-dominated culture witnessing greater and greater human-and-machine symbiotic interfaces both to normalise human functions and to enhance human functioning. In this cyborg discourse, the term, posthuman, has emerged to question what it means to be human, and if the technological has taken over human agency in this symbiotic relationship. How real and critical are these concerns? To help find possible answers, the thesis calls upon a particular cyborg, one that is highly imaginative and resolutely political from a different fictive world. Meet Donna Haraway's cyborg, "a creature of social reality as well as a creature of fiction" from her seminal essay, "A Cyborg Manifesto: Science, Technology and Socialist-Feminist in the Late Twentieth Century" (149-150). Haraway claims:

> By the late twentieth century, our time, a mythic time, we are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs. The cyborg is our ontology; it gives us our politics. (150)

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[8] PAP stands for People's Action Party, which is the ruling government party in Singapore. Described as a one-party state because of the party's overwhelming dominance of Parliament, Singapore has only two out of the eighty-four parliamentary seats represented by the elected opposition from the last election of 2006.

Haraway is suggesting accepting fully the ontological status of the cyborg from its machine-and-organism symbiosis because returning to its separate states is not possible or even desirable any longer. If we recall a signifier of the cyborg that it is always located in a body, Haraway's cyborg provides a platform for examining these productive tensions and possibilities between the technological and organic, at the ontological level, to discover what is essentially human in this symbiotic machine-human relationship. To be human, as discussed earlier, is a dynamic process related to 'being', and hence, the ontological status of a human *being* cannot be fixed in its meaning, but one that needs to be continually negotiated. On the question of politics, Haraway's statement that the cyborg gives us our politics, however, is more ambiguous. Her general position on technology is quite clear. She is not a technological determinist and she does not believe that "the information revolution automatically produces liberatory effects" (Sofoulis 368). Neither is she anti-science being a trained biologist herself, nor one who rejects technology (Hekman 85). At the same time, she realises the new technologies have produced "the scary new networks", which she describes as the "informatics of domination" intensifying the categories of class, race, and gender (161). Is Haraway suggesting that the new technologies have increasingly more politics of domination and inequalities, and/or is she suggesting that accepting new technologies has become a necessary political strategy to survive in her informatics of domination? These questions raised by Haraway's cyborg are crucial as we experience increasing cyborgisation in our present times. iN2015 sees the cyborg as a technologically enhanced state that is desirable but is totally uncritical in its embrace of the technologically possible, unconditionally adopting new technologies without deliberation over their consequent socio-political impact, or even ontological possibilities. Twenty-five years later after the Manifesto is written, are we witnessing an informatics of domination replicating itself in the cyborgian

future of iN2015? What ontology and politics are inherent with new technologies, and how can we adopt a proper relationship with cyborgian technologies that are now a crucial part of modern societies?

If we accept Haraway's cyborg ontologically and politically, do we get implicated in the bind with technology? Haraway's techno-politics through her cyborg has come under criticism from another critic of technology, Paul Virilio. Stemming from his "epistemo-technical" approach (Virilio and Lotringer 36) that references Heidegger's meta-philosophical discourse on the essence of technology,[9] Virilio argues that the speed imperative and the potential accident inherent in technology come from its military origins. From his study of speed in history called dromology, Virilio asserts that "history progresses at the speed of its weapon systems" (68). The speed imperative in new technology has become a source of capital and power such that the technology of pure speed changes politics more than politics is able to change technology: a situation that Virilio foresees rapidly worsening towards "an integral and globally constituted accident" (Virilio and Armitage, "Kosovo W@R" 192). The thesis hopes to locate positions where Haraway and Virilio intersect, and where they depart, in order to clarify how Haraway's cyborg metaphor can still be relevant in analysing today's new technologies. While the thesis deals mainly with these arguments from Haraway and Virilio, a small but necessary detour will be made to Gillian Youngs whom we encountered earlier in her cautionary note about technology as an ideology of progress. Youngs adopts an approach in her study of technology that is anchored in political economy analysis. Her examination of the role of technology on the global political economy shows inequality as the driving force behind development, cloaked ever more so in the empowerment language of

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[9] In Heidegger's famed essay, "The Question Concerning Technology", he argues that when we affirm or deny technology, this enslaves us to technology. But worse than this either-or position, is to consider technology as neutral. For Heidegger, the essence of technology must be understood so that a free relationship to technology can established, one that is not enslaving.

technology. Her argument reaches the same conclusion, that of growing socio-political disparities, as Haraway's exposition of her informatics of domination, and Virilio's of speed as a source of capital and power. But it is her position on the persistent state of inequality that helps to illuminate the contradictions of modern technology and the promise of progress. Ultimately, the thesis is interested in bringing these arguments from the three writers to provide a critical discourse on the cyborgisation of *intelligent nation* Singapore driven by the iN2015 vision.

5   Structure of the thesis

The first chapter examines cyborg ontology and politics through Haraway's Manifesto to engage with her multifarious cyborg. It seeks primarily to understand how the 'border war' between organism and machine ends up constructing her cyborg as a metaphor holding promises and hopes as well as dangers and threats in dealing with new technologies. The cyborg hybrid gives occasion to reflect on, what Haraway describes as, three boundary breakdowns: human and animal, machine and organism, and the physical and non-physical. In these breakdowns, new technologies described as "the disturbingly alive machines" have reduced all living organisms into biotic components or information-processing units (152). Such cyborg ontology and politics have resulted in the informatics of domination intensifying the categories of class, race, and gender. Virilio's war model of the growth of the modern city comes next under the spotlight for the ways this has led to 'speed-space' and chronopolitics, reinforcing Haraway's informatics of domination. Youngs comes in to show how technology is one of the major factors today in the global political economy, in which power is possessed and maintained, and how inequalities are distributed and persist along socio-economic and gender grounds. She questions the mismatch between the theory and practice of neoliberalism that espouses goals of equality

and equal rights, even as evidence points in the opposite direction with inequality actually driving growth and development. The concluding question after looking at these three writers is whether cyborg politics and ontology can be reconfigured to confront these dominations in Haraway's post-gender world that is consciously struggling against "unity-through-domination" or "unity-through-incorporation."

The second chapter returns to the iN2015 vision to examine what kind of cyborg body/bodies are being produced, and how such cyborg body/bodies relate to existing social reality, given the promise of infocomm for every individual. Two IDA videos marketing the iN2015 vision provide vital clues through their narratives to see how individual bodies, and whose bodies, are 'enriched' and 'enhanced', words that have been constantly used to emphasise the empowerment message behind iN2015. What do these narratives tell us about the ontology and politics in the empowerment of cyborg bodies in *intelligent nation* Singapore in 2015? Does everybody have the same empowerment becoming a cyborg or are these identities already economically determined? The chapter also addresses cyborg identity in iN2015 as a kind of technological citizenship in Singapore that obliges citizens to be technologically knowledgeable to the extent of being mainly media savvy users and consumers in the knowledge-based economy, and how this relates to the structures of inequalities being produced in *intelligent nation* Singapore. Haraway's cyborg, as female and feminist, spotlights the gender relationship to new technology, a subject that warrants attention given the *ferociously* gendered roles in the iN2015 vision.

In the third chapter, Virilio's dromology becomes relevant for the ways ITR5 demands constant changes in the Singapore economy and for society to keep up with technological innovations. The chapter investigates how the technology of pure speed is responsible in chronopolitics for producing new speed classes such as "the global kinetic

elites" and "the virtual class" as new centres of power, while at the same time, aggravating growing socio-economic inequalities. With technology transfers between military, civilian and entertainment worlds, the chapter discusses a condition called the politics of disappearance, creating the hypermodern world imagined in iN2105, where sensual and bodily experiences are deterritoralised in favour of a virtual world. The chapter closes looking at how ITR5 views problems of the cyborgian future from its technocratic frame of mind through Virilio's perspective of technology and its potential accident.

Finally, the concluding chapter returns to the central questions querying the kind of politics and ontology unfolding and impinging on cyborg bodies in *intelligent nation* Singapore. Without a doubt, iN2015 is speeding up the cyborgisation of Singapore, obliging everyone to become technological citizens to live a life in technicity, a hypermodern techno lifestyle, in a cyborgian society witnessing greater socio-economic disparities and gender inequalities. Haraway's anti-dualism in the ontology of the cyborg and its techno-politics, Virilio's techno-speed criticism, and Youngs' nexus between inequality and technology, provide critical tools to deal with the cyborgian future in *intelligent nation* Singapore. Where they intersect, they expose the cyborg future as one fraught with the politics of inequalities that must be continually exposed behind the gloss of a technologically perfect, hypermodern world. However, as Haraway asserts, there is no turning back materially and ideologically. The cyborg is our ontology, and while it may be responsible for a kind of politics, we need to deal with the informatics of domination rather than to jump on the technology bandwagon, just to keep ahead. What would be the position between Haraway's cyborg that does not and cannot reject technology, and Virilio's cautionary disavowal of these technologies of speed? Such a question underlines the complex ways in which new technologies interact with the

political economy, and how that interaction produces the ambiguities and duplicities of

empowerment for different cyborg bodies.

Chapter One

Cyborg Ontology and Politics: Haraway, Virilio & Youngs

When Donna Haraway wrote the Cyborg Manifesto, she was looking for a metaphor that suited its times, that of the 1980s. Marked by the resurgence of the armed race between the United States and the Soviet Union, and the growing neoliberalism in Reagan's America and Thatcher's Britain, the era also witnessed the beginnings of the Internet and scientific developments in genetic engineering that led to the Human Genome Project. Haraway had a specific audience: feminists, at a crossroad in search for new paradigms, as universal theories informing feminism in its second wave became no longer relevant (Hekman 85). The purpose of the Manifesto, in Haraway's words, was, "to build an ironic political myth faithful to feminism, socialism and materialism" (149). When the Manifesto was published, its impact, described as nothing short of cataclysmic, was one that shifted debate about culture and identity all through the late 20th century. This chapter will look at the major arguments in the Manifesto in order to understand Haraway's cyborg who is anti-dualism and advocates techno-politics. How relevant is Haraway's cyborg metaphor as a lens to inspect new technologies and the cyborgisation processes at work today? To find out, the chapter also engages Paul Virilio's techno-speed criticism that is ultimately critical of all cyborgian technologies, and briefly, Gillian Youngs who reveals a driving force in current economic systems that undermines the empowerment message in technology. This chapter argues that Haraway's cyborg continues to provide a relevant analysis of today's new technologies but questions the efficacy of her techno-politics. To begin, Haraway's cyborg now takes centre-stage.

1.1   Cyborg ontology and leaky boundaries

The Cyborg Manifesto sits in a collection of essays in a book titled *Simians, Cyborgs, and Women* (149-181). The three that are named in this title are described by Haraway as "odd boundary creatures" for they signify "a destabilising place in the great Western evolutionary, technological, and biological narratives" (2). To understand what she means, the key word here is boundary. A boundary means a dividing line that marks the limits of an area, and boundaries can be crossed, contested, breached, and even altered. For Haraway, a professor with a PhD in biology, nature, with its shifting boundaries, has always been constructed, so much so that these constructions are "crucial cultural processes for people who need and hope to live in a world less riddled by the domination of race, colonialism, class, gender, and sexuality" (2). The odd boundary creatures, she points out, are 'monsters', which have much to share with the word, demonstrate, and therefore, they signify (2). How do they signify? Monsters, popularly understood as large, ugly, frightening, or wicked, disrupt our understanding of what is commonly accepted as normal and human, and therefore, monsters disrupt identities. In the same way, hybrids seen as a superior state over its constituent parts also disrupt boundaries. Therein lies the nature of the cyborg – its monstrosity from one perspective and its hybridity from another perspective, and both to do with boundaries. The references to monsters and hybrids in the cultural discourse of the 1980's were very much influenced by scientific research going on, especially, in genetic engineering (facilitated greatly with ICTs). Technoscience was producing "new objects" having more and more "leaky and unstable boundaries formed in the interaction of material and semiotic effects" (Sofoulis 370). Recalling Haraway:

> "By the late twentieth century, our time, a mythic time, we are all
>
> chimeras, theorized and fabricated hybrids of machine and organism; in

short, we are cyborgs. The cyborg is our ontology; it gives us our politics"

(150).

What does it mean that the cyborg is our ontology? And how does it give us our politics? To find answers, Haraway's cyborg has to be investigated ontologically, after which its political nature will be discussed. We begin with the ontology of the cyborg and its boundary breakdowns.

The cyborg, an abbreviation of cybernetic organism, is part organism and part machine, and this relation between organism and machine, according to Haraway, has been a "border war", given the history of capitalism, the tradition of progress, and the evolution of science and technology (150). A border war implies a contestation of boundary. In the cybernetic organism or cyborg, this border war is between the organism or its organicity and the machine or the technological, over a boundary that is unstable or "leaky" (Haraway 152). The border war between organism and machine has given occasion to reflect on three crucial boundary breakdowns. The three boundaries pertain to human and animal, machine and organism, and the physical and non-physical; all three having leaky distinctions. The first human-and-animal boundary, Haraway explains, has been completely breached by late 20th century such that the need for a separation between the two is no longer much considered. Examples of the animal-human symbiotic relationship flourish in "language, tool use, social behaviour, mental events", and most certainly, in the world of biology that Haraway comes from (151). Thus, she asserts that biology and evolutionary theory have "simultaneously produced modern organisms as objects of knowledge and reduced the line between humans and animals to a faint trace […]" (152). With genome research revealing common genes between humans and animals, Haraway's point is indisputable. She also mentions the animal rights movement to remind us of growing affinities and the pleasures of connections with the animal world.

The cyborg, she asserts, "appears in myth precisely where the boundary between human and animal is transgressed"; thus, cyborgs signal "disturbingly and pleasurably tight coupling" (152). Here we are reminded of both the cyborg's monstrous and hybrid nature.

The second boundary breakdown or leaky distinction is between animal-human (organism) and machine, more commonly perceived as the cyborg configuration rather than the animal and human symbiosis. Cyborgs, hybrid of organism and machine, are now compounded of "special kinds of machines and special kinds of organisms appropriate to the late 20th century" (Haraway 1). For Haraway, cyborgs are definitively post-Second World War hybrid entities, where new technologies have transformed its two constituent parts, organism and machine. The first, organisms, which includes humans and all other organic creatures, have become "information systems, texts, and ergonomically controlled labouring, desiring and reproducing systems", and the second, the machines themselves have also become "communications systems, texts, and self-acting, ergonomically designed apparatuses" (ibid 1). Before the language of cybernetics was discovered, machines were tools and appendages, "not self-moving, self-designing, autonomous", but now "late 20th century machines have made thoroughly ambiguous the difference between natural and artificial, mind and body, self-developing and externally designed, and many other distinctions that used to apply to organisms and machines" (ibid 152). These latter machines are precisely the modern ICTs or, what the thesis has been referring to as, the cyborgian technologies.

The third boundary between physical and non-physical, a subset of the second boundary, Haraway reflects, is new and still imprecise at this stage. What is clear is that the modern machines, as micro-electronic devices with their computer chip, are relentlessly "everywhere" and "invisible" (Haraway 153). The machines could be our everyday electronic devices, such as home-use videos all the way to cruise missiles.

These micro-electronic devices, getting smaller and more miniaturised, have become "light and clean" being purveyors of pure information, signals and electromagnetic waves. It is the ubiquity and invisibility of these "sunshine belt machines" that makes them deadly, as they are "hard to see politically and materially" (Haraway 153).

In understanding Haraway's statement that the cyborg is our ontology, what is important to grasp is the boundary breakdowns and their *leaky* nature. Hybridity or, for that matter, monstrosity, can only take place precisely because of the leaky boundaries. The boundary breakdowns compel Haraway to reject the dualisms that have riddled Western thinking, such as "mind and body, animal and machine, idealism and materialism in the social practices, symbolic formulations, and physical artefacts associated with 'high technology' and scientific culture […]" (154). Hence, the cyborg metaphor is about breaking down boundaries and, ontologically, the absence of an essential unitary state of being. While the coupling can be pleasurable, it can also be disturbing. This is the cyborg's "main trouble": it is "the illegitimate offspring of militarism and patriarchal capitalism, not to mention state socialism" (Haraway 151). From these origins, the cyborg world could also be, Haraway admits, "the final imposition of a grid of control on the planet" (154). How this can happen, Haraway warns us, is because: "Our machines are disturbingly lively, and we ourselves frighteningly inert" (152). What Haraway is implying here is that humans are inert and passive, while machines today have capabilities that humans could be unaware of or have no control over. The 'disturbingly lively' machines, in fact, are already producing "the scary new networks", which Haraway labels as "the informatics of domination" (161). Hence, she aptly describes her cyborg as "oppositional, utopian and completely without innocence" (151). It is oppositional because it opposes essentialisms and dualisms; it is utopian because it celebrates potential couplings of human hybridity with the animal-machine worlds; and it

is completely without innocence because of its main trouble, forming the informatics of

domination, which we will now encounter.

1.2   Cyborg Politics – the informatics of domination

The cyborgian times have witnessed an informatics of domination brought on by

the new machines that are, in Haraway's lucid words, disturbingly alive. These new

machines have reduced organisms to biotic components, that is, information-processing

units, which are understood and studied in terms of "design, boundary constraints, rates of

flows, systems logics, costs of lowering constraints" (162). Everything exists in systems

architecture, reducible to statistics and probability; even sexual reproduction, which

Haraway quotes as an example, has become one reproductive strategy among many

assessed in terms of costs and benefits within a systems environment. She says: "No

objects, spaces, or bodies are sacred in themselves; any component can be interfaced with

any other if the proper standard, the proper code, can be constructed for processing

signals in a common language" (163). In other words, the world and every living thing in

it are now reduced to information as quantifiable data and "a problem in coding"

(Haraway 164). Haraway sets up a list comparing the "comfortable old hierarchical

dominations" of white capitalist patriarchy translating to the informatics of domination,

mediated by new technologies (161). Examples given are microelectronics mediating the

"translations of labour into robotics and word processing, sex into genetic engineering

and reproductive technologies, and mind into artificial intelligence and decision

procedures" (Haraway 165). Modern biology has become one of inscription rather than

one as clinical practice, meaning that organisms are now reduced into problems of

"genetic coding and read-out" (Haraway 164). In this list[10], it is important to bear in mind that the informatics of domination have not necessarily done away with preceding socio-cultural-political issues, many of which have been re-cast in the language and semantics mediated by the new technologies. Since her cyborg is female and feminist[11], let's look at the situation of women in the informatics of domination in order to better grasp how things have changed.

ICTs have certainly changed women's participation in the economy. The image of women in the integrated circuit is generally associated with Asian women in the multinational microelectronic factories employed for their nimble fingers. Often women accept lower wages than men who therefore shun the work. In this context, Haraway mentions how women are integrated but at the same exploited in a world system of production/reproduction[12] governed by these new technologies. But this image of women in the integrated circuit (Rachel Grossman qtd in Haraway 165) has also been borrowed to show the dispersion of women's place in the informatics of domination. The traditional division of the public and private domains in describing women's lives in the informatics of domination is no longer relevant and, in fact, has become "a totally misleading ideology" (Haraway 170). The public/private domains for the working class would have been factory and home; for bourgeois life, it is the market and home; and of gender existence into personal and political realms. Haraway then takes idealised social locations from the perspective of advanced capitalist societies - home, market, paid work place,

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[10] More examples of the pairing in the list are: representation - simulation; depth, integrity - surface, boundary; eugenics - population control; hygiene - stress management; reproduction - replication; scientific management in home/factory - global factory/electronic cottage.

[11] Haraway does not state categorically in the Manifesto that her cyborg is female, although this is implied and confirmed only much later in an interview with Nicholas Gane in 2006.

[12] Reproductive technologies are another area of how women's bodies are regulated and disciplined through the new technologies, which forms a whole subject on its own and is beyond the scope of the thesis.

state, school, clinic-hospital and church - to show how social relations and, especially, women's position in these locations have been mediated by new technologies. As an example, let's look at paid work place in the informatics of domination, and I quote her verbatim here:

> Continued intense sexual and racial division of labour, but considerable growth of membership in privileged occupational categories for many white women and people of colour; impact of new technologies on women's work in clerical, service, manufacturing (especially textiles), agriculture, electronics; international restructuring of the working classes; development of new time arrangements to facilitate the homework economy (flex time, part time, over time, no time); homework and out work; increased pressures for two-tiered wage structures; significant numbers of people in cash-dependent populations world-wide with no experience or no further hope of stable employment; most labour 'marginal' or 'feminised'. (171)

The world of new technologies has produced the 'homework economy' outside the home, characterised by the presence of female jobs described as jobs literally done by women and redefined as female and feminised, whether performed by women or men (Richard Gordon qtd in Haraway 166). What 'feminised' means here, is "to be made extremely vulnerable; able to be disassembled, reassembled, exploited as a reserve labour force; seen less as workers than as servers; subjected to time arrangements on and off the paid job that makes a mockery of a limited work day […]" (Haraway 166). With the feminisation of poverty (that is also now affecting men), it is now common to be employed, *and,* at the same time, poor.

Haraway characterises the informatics of domination as a time of intense and massive insecurity together with cultural impoverishment, and the total failure of "subsistence networks for the most vulnerable" (172). Thus, the informatics of domination and the advent of new technologies are fraught increasingly with more, not less politics, intensified along the hierarchies of class, race, and gender. In analysing women's situation restructured through the social relations of science and technology, Haraway is rejecting technological determination, and sees instead technology as steeped in a historical system of structured relations among people. Hence, she calls urgently for a socialist-feminist politics addressing science and technology, and here, she invokes her cyborg.

1.3 *Haraway's cyborg myth in a post-gender world*

Recalling the three boundary breakdowns, the first between human and animal gives Haraway hope for the way to approach the other two boundary breakdowns. The pleasurable, affective, and symbiotic coupling of the human-animal relationship gives Haraway encouragement for her cyborg:

> From another perspective, a cyborg world might be about lived social and bodily realities in which people are not afraid of their joint kinship with animals and machines, not afraid of permanently partial identities and contradictory standpoints. The political struggle is to see from both perspectives at once because each reveals both dominations and possibilities unimaginable from the other vantage point. (154)

The cyborg myth, thus, represents "transgressed boundaries, potent fusions and dangerous possibilities" (Haraway 154). In the early part of the Manifesto, Haraway says: "The cyborg is a creature in a post-gender world" (150) and near its end, she alludes to the

utopian dream of "a monstrous world without gender" (181). What does she mean by 'post-gender'? For Haraway, 'post-gender' does not mean a utopia where being a man or woman does not matter, or a world "without desire, sex and an unconscious" (Gane 150). Neither is it a "transhumanist technoenhancement" utopia (ibid 140). Post-gender, she means, is how peoples and worlds are reconstructed as information (examples will be the Human Genome Project and Visible Human Project). In fact, she sees the world both as 'post-gender' and, at the same time, one that is "ferociously gender-in-place" (ibid 137), evidenced by women's dispersed and changing positions in the integrated circuit as described earlier. But post-gender, for Haraway, was a way to move away from looking at techno-science from the feminist response of that time, seeing technology as masculine and rejecting technology to return to the female/nature/feminine world. In the Manifesto, Haraway makes her rejection of this position very clear, that is, the position closely identified with the radical and eco-feminists, to the extent that the Manifesto was seen as dropping feminism altogether. But Haraway's cyborg is resolutely feminist. Her rejection of the radical or the eco-feminist position stems from a rejection of the totalising process in the search for the unity of women. This happens when the women's movement is taxonomised, making "one's own political tendencies appear to be the *telos* of the whole" (Haraway 156). Taxonomies of feminism produce epistemologies, she elaborates, which end up policing deviation from accepted norms. This results in either incorporating or marginalising different feminisms. If this theoretical and practical struggle against "unity-through-domination or unity-through-incorporation" is vigorously adopted, then justifications for all other -*isms* such as "patriarchy, colonialism, humanism, positivism, essentialism, scientism and other unlamented –isms" are undermined (ibid 157). This is why gender, race, and class, understood now historically, cannot provide "the basis for belief in 'essential' unity" (ibid 155). Where gender is concerned, there is nothing about

being 'female', which naturally binds women; 'women' itself being "a highly complex category constructed in contested sexual scientific discourses and other social practices" (ibid 155).

A post-gender world is, thus, a world without gender, in the idealistic sense that people do not become assimilated, marginalised, essentialised by their gender, or equally by their race or class. These categories are markers "forced on us by the terrible historical experience of the contradictory social realities of patriarchy, colonialism and capitalism" (Haraway 155). Instead, the post-gender will allow new possibilities of being, new affinities, and new kinships with machines and animals, represented in the cyborg and its 'monstrous' nature. It is these monstrous selves so richly imagined in feminist science fiction that Haraway turns to for answers in our post-human times re-defining ourselves in relation to machines. Monsters, she continues, "have always defined the limits of community in Western imagination" giving the examples of Centaurs and Amazons of ancient Greece, or the un-separated twins and hermaphrodites of early modern France (180). The cyborg monsters in feminist science fiction offer new and different political possibilities in a more constructive light. The ultimate purpose of the Manifesto, declares Haraway, is "an argument for *pleasure* in the confusion of boundaries and for their *responsibility* in their construction" (150).

At this juncture, the question needs to be asked if Haraway is overly optimistic about her politically conscious cyborg in search of new hybridities of meanings while negotiating the informatics of domination. Undoubtedly, Haraway's cyborg metaphor provides a complex understanding of the productive tensions in the relationship that humans have with the new machines, materially and ontologically. Without a doubt too, the cyborg metaphor through its boundary breakdown of *disturbingly alive* machines and *frighteningly inert* humans also provides an excellent account of the informatics of

domination that has witnessed more, and not less, politics, reinforced along fault lines of race, class, and gender. In this sense, the cyborg gives us our politics, which can be taken to refer to the politics in the informatics of domination. To confront this politics, it will also be a cyborg but not any cyborg who is just an enhanced human-machine hybrid. It has to be Haraway's cyborg with its feminist politics committed to "fundamental changes in the nature of class, race and gender" in the emerging world order mediated by new technologies. Ontologically the cyborg metaphor can help to question the categories of class, race, and gender as entrenched markers of identity, but how effective will it be in confronting the informatics of domination? In order to answer this question, the thesis will like to bring in Paul Virilio and, briefly, Gillian Youngs.

1.4   Living permanently in speed-space

While Haraway locates the origins of the new technology in the power structures of the military and patriarchal capitalism, Paul Virilio elaborates on this nexus of technology and military with his war theory and techno-speed criticism. For Virilio, everything starts in war and preparations for war, framing his war model of the modern city and of human society in general. He is well known for his study of speed in history, inventing the term, dromology, which essentially claims the logic of speed as the foundation of technological society. In his book, *Speed and Politics*, Virilio makes the renowned statement: "history progresses at the speed of its weapon systems" (68). Virilio observes that war-making technology has a logic of ever-increasing acceleration, which determines how the modern city has grown, and how human culture has evolved. The history of acceleration that began with transport, moving goods, people and troops, is today the quest itself, Virilio asserts, for the attainment of real time. But with technology breaking through the light barrier, after that of sound and heat, we now live in a light-

speed era of real time. Virilio describes this condition of real time superseding real space as 'speed-space', a characteristic of dromocratic societies. "Today, almost all current technologies put the speed of light to work", such that "the speed of light does not merely transform the world. It becomes the world." (Virilio and Armitage, "Kosovo W@R" 185). In another interview, Virilio elaborates:

> Information transmission is thus no longer concerned with the bringing about of a relative gain in velocity, as was the case with railway transport compared to horse power, or jet aircraft compared to trains, but about the absolute velocity of electromagnetic waves. (Virilio and Armitage, "From Modernism to Hypermodernism" 27).

While Haraway critiques the disturbingly alive machines reducing the world and everything in it to quantifiable data and 'a problem in coding', Virilio critiques the technology of speed that has now deterritorialised real space taken over by real time. In Virilio's 'speed-space', speed is no longer a mean to go somewhere but a milieu characterised by instantaneity, simultaneity, and ubiquity. In the same critical vein, Virilio rejects virtual reality, viewing it as the most insidious technology that the military world has bequeathed to consumer culture.

According to Virilio, virtual reality is a substitute for the real; so there are two realities today, one virtual and one real. New technologies are making virtual reality so powerful that Virilio fears it will take over actual reality. He decries, for example, the notion of cybersex as a technological replacement over human emotions. For Virilio, the aesthetics of virtual reality hides its alienation from reality. While other art mediums use objects and aspects of life for depiction, virtual reality uses the whole of reality as its art, thus making the virtual a substitute to the actual. This rupture with reality makes virtual reality an accident of reality. For Virilio, using these new new tools becomes complicit in

their seduction by an aesthetics of disappearance so that the political nature of the tools becomes easily forgotten. To understand how this happens, Virilio's accident theory of technology becomes pertinent.

Virilio observes that every time a technology is invented, an accident is invented together with it. For Virilio, the question should not be asked about whether we can do without technology; instead, the question of technology should be expanded "not only to the substance produced but also to the accident produced" (Virilio and Lotringer 46). For example, to invent the train is also to invent the potential of derailment, or to invent the aeroplane, there is the potential of the air crash. In other words, technology does not exist without the potential of its accompanying accident. "The riddle of technology", he says, "is the riddle of the accident" (ibid 46). Virilio elaborates:

> As an art critic of technology, I always try to emphasize both the invention and the accident. But the occurrence of the accident is being denied. This is the result of the hype which always goes together with technical objects as with Bill Gates and cyberspace, for instance. The hype in favour of technology dismisses its negative aspects. (Virilio and Armitage, "From Modernism to Hypermodernism" 32)

For Virilio, war is the biggest accident of all. Here Virilio makes us reflect of how we tend to view technology only positively, even with war machines when they are actually machines of destruction with annihilation as their main objective. Of these war machines, Virilio states: "They are machines in reverse – they produce accidents, disappearances, deaths, breakdowns. I think war in this sense conveys something which at present we are experiencing in peacetime; the accident has now become something ordinary" (Virilio and Dercon 72). I understand Virilio here in two ways. Firstly, the relationship between technology and accident has become obscured, masking the catastrophic potential of

technology. In his dromological study, the speed achieved in our modern weaponry system also drives cultural and social development. Thus, if war is "the laboratory of speed", then war has been "the laboratory of the future" (ibid 72). Many consumer technology like the video camera, mobile phones, virtual reality, and Global Positioning System, have their origins in military research. The technology of speed, thus, becomes part of the consumer landscape, and its war origins become imperceptible. The second point about the accident in technology is that when something becomes ordinary, we get used to its presence and become desensitised to its reality. If we recall Judy Wacjman's statement of how we do not see the 'power' exercised by technical objects or technical systems, technical systems have become completely integrated into the social fabric, disappearing into the landscape.

There are two levels of desensitisation operating here for Virilio. The first is that wars today are increasingly fought not on the battlefields but through imaging machines. Virilio says, "[…] nowadays the tragedy of war is mediated through technology. It is no longer mediated through a human being with moral responsibilities" (Virilio and Armitage, "Kosovo W@R" 185). Cruise missiles deploy radar readings and pre-programmed maps, as they follow their course towards their target. Missiles are flying cameras with "sightless vision", that is, "vision without looking" (ibid 185). This is a vision without responsibility. The second level of desensitisation is how media, such as television, has become "a museum of accidents" (Armitage and Wilson, "Cyberwar, God and Television" 1), producing a distance from immediate reality. Watching war coverage on television, or a major disaster in our living room, is like visiting a museum show of accidents on display. Virilio declares: "Every technology, every science should choose its specific accident and reveal it as a product – not in a moralistic, protectionist way (safety first) but rather as a product to be 'epistemo-technically' questioned" (Virilio and

Lotringer 47). Ignoring the riddle of technology for Virilio puts us in a state of 'pure war', a state in which politics has disappeared, but of which we are not aware. This makes Virilio concerned with a kind of accident arising from the new technologies that we have not seen before.

The networked information processing systems have such power invested in them that it becomes increasingly difficult to pinpoint hierarchies of control and responsibility. These technologies of pure speed characterised by instantaneity, ubiquity, and simultaneity, he fears, will lead to the "integral and globally constituted accident" (Virilio and Armitage, "Kosovo W@R" 192). An example is the Wall Street crash in 1987 caused by systems failure in program trading when the automatic quotation of stock values accelerated and propagated the crash. The other example is the Asian financial crisis of 1997 caused by foreign exchange speculation, the speed of which brought ruin overnight to many Asian economies. Instantaneous interactivity and the velocity at which information flows concern Virilio, because these areas are still not completely understood, nor can they be controlled completely. Virilio calls this the technological bomb or the information bomb, which is hard to predict or to control when there is a breakdown. The information bomb is something that happens simultaneously everywhere, "not localised as a specific accident, […] much like a bomb that goes off, but just that we don't even know what it is that went off" (Virilio and Lotringer 199). Such is the extent of Virilio's distrust of the new machines and his critique provides added meaning to Haraway's description of these machines as disturbingly alive.

Virilio's techno-speed criticism is invaluable in dismantling the ideology of progress embedded in technology. The idea that technology brings progress automatically is often linked with the corresponding belief that progress also brings equality for all. But

the technology of speed that prevails in the informatics of domination has surfaced speed

now as a source of capital and power. Virilio says:

> […] the history of the world is not only about the political economy of
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> riches, that is, wealth, money, capital, but also about the political economy
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> of speed. If time is money, as they say, then speed is power. […] the
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> higher speeds belong to the upper reaches of society, the slower to the
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> bottom (Virilio and Armitage, "From Modernism to Hypermodernism"
>
> 26).

For Virilio, it is no longer just about possessing wealth and riches but about possessing

speed as a source of power, and this relates to Gillian Youngs' argument about how speed

is an agenda pushed by those that have the tools and who can benefit from this.

1.5   *The persistence of inequality*

When Youngs examined the impact of technology on the global political

economy, she differentiated the approach to technology as an exogenous factor (external

to social processes or dynamics) or an endogenous factor (internal to social processes or

dynamics), and adopted the latter in her analysis. Technology as an endogenous factor

when introduced into existing set of social relations and processes, "will impact on them

and evolve as part of them in anticipated and unanticipated, constructed and serendipitous

ways" ("Global Political Economy" 3). Her study reveals how new technology has

become structurally relevant in the way power is attained and maintained in the globalised

world order. Youngs finds evidence to show inequality deepening in complex ways

within and across states, "signaling the threat that information age developments may

further embed the inequities of the industrial age, particularly those related to socio-

economic and gender differences" (ibid 8). This conclusion concurs with Haraway's

exposition of the growing inequalities in the informatics of domination. But Youngs uses a slightly different argument to explain the stubbornness of the inequalities entrenched by the advent of new technologies. Observing the extent of the inequalities across the world and within individual societies, the length of time that such inequalities have persisted, and the fact that many countries are getting worse not better, Youngs concludes that inequality is actually driving growth and development (ibid 93). She argues, "These benefits are so unevenly divided both between and within richer and poorer countries, that the overarching driver in the system could be argued to be inequality itself" (ibid 92). Hence, it is not technology per se that is driving growth and development, but inequality cloaked in the language of neo-liberalism that believes it is promoting equality and equal rights while achieving the opposite. This mismatch between the theory and practice of neo-liberalism makes Youngs highly critical of the active promotion of ICTs as development tools, because "they are yet another set of developments that allow the richer to further embed their advantages at all levels" (ibid 72). The message of ICTs as the "angel of hope" with its "universal vision of a digital future", she believes, is "an agenda with a context and that context is the unequal world of contemporary globalization" (ibid 72). Youngs shows how technology has structurally maintained power structures in the globalised world order, recasting existing inequalities in new forms, while forging entirely new structures of inequality. The existing inequality based on gender was discussed earlier through the analogy of Haraway's women in the integrated circuit. Similarly, Youngs asserts that ICTs carry the gendered legacy of historically established male dominance in the way science and technology develops, with women's relationship to modern technologies largely defined and mediated by men ("Feminizing Cyberspace" 84). The world of ICTs for both Youngs and Haraway is more

gendered, but this inequality is not in the public eye because the historical pattern of

gender relations to technology has always lain hidden from society.

A new structure of inequality that has emerged is the digital divide, presented now

as a new form of inequality, but which actually is a reflection of existing socio-economic

disparities. Youngs stresses, "the digital future is a highly unequal one" ("Global Political

Economy" 105). Her reason being that if wealth is unequally distributed, a digital divide

in ICTs will always exist, as the digital divide represents past and existing wealth divides.

More fundamentally, the digital divide suggests how future divides in wealth may take

shape, as ICTs increasingly determine the ability of individuals, firms, and nations to

create future wealth. All statistics on the global digital divide show a widening disparity,

mainly because the digital world does not stay static, and more powerful ICTs are being

added to existing layers of inequality.[13] In line with Virilio's speed as a new source of

capital and power, Youngs looks at the political economy of time and its startlingly

implications for inequality. Youngs observes that the arrival of the web concretized this

24-hour reality, providing "a virtual space within which trading, advertising, networking,

information provision, online banking, etc., could literally go on non-stop around the

clock" (ibid 67). The global financial market, an icon of the ICT era, has become an

incessant arena of virtual exchange linking major cities round the word, while the

majority of the world's poorest, left out completely of the digital economy, are still living

in starvation economies, governed by "pre-industrial agricultural season time" or

"industrial era clock time" (ibid 67). Youngs asked what inequalities can be revealed in

this hidden political economy of time whereby "the most privileged and developed areas

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[13] Data and statistics which confirm the endurance of the digital divide can be found from reports
by the various United Nations agencies, such as International Telecommunication Union's "The
World Information Society Report 2008" and United Nations Conference on Trade and
Development's "The Digital Divide Report: ICT Diffusion Index 2005." To arrive at her
conclusions, Youngs uses data from the Human Development Reports published by United
Nations Development Programme.

of the global economy are intensely locked into the experience and benefits of the new factors of speed", while those "at the opposite end of the wealth and development spectrum are forced into a different temporal political economy" (ibid 68). She states: "It is clearly the richest economies and their corporations that are driving the speed agenda through infrastructural and technological developments, innovations in products and services, new working practices and forms of intensified consumption" (ibid 68). She believes that ICT development with all its potential and possibilities only serve to complicate further the pressing problems of global and local inequalities. ICTs in themselves are a source of inequality given the exponential gains to be made from the technological lead that the richest countries have over the poorest. This source of inequality resides in the ownership and control of varied forms of expert knowledge, scientific and technological, as well as applications of these forms of knowledge. Thus, technology has been become a tool of power to entrench existing privileges in a world that espouses equality but is witnessing greater socio-economic disparities.

1.6   To be a cyborg or not to be …

Haraway's cyborg metaphor has offered an invaluable framework to interrogate the cyborgisation processes at work today given that modern ICTs are everywhere and invisible. Haraway sees much to learn from our fusions with the animal and machine worlds, while accepting the ontological status of the cyborg in its human-machine hybridity. However, she is also aware that the machines are disturbingly alive while humans are passive and inert, thus allowing the technical to take over the human element, heralding in the informatics of domination. Virilio, on the other hand, is more critical of the power inherent in technology through his techno-speed critique. He sees a growing contraction of human control over machines, and the technical qualities of war and speed

diminishing the arena of the political. Youngs observes that ICTs are being used as a tool to promote equality but delivering inequality. Ultimately, the three writers intersect in being sceptical of the ideology of progress embedded in technology, and all arrive at the same conclusion-that new technologies are themselves fraught with more politics of inequalities while reinforcing traditional power hierarchies. But I do not see the three writers, certainly not Haraway, rejecting technology outright. They are critical but they are not the Luddites of today's cyborgian technologies. Virilio comes close to being labelled as one, providing the most scathing critique of the three and disapproving many developments in new technology, such as virtual reality. But even with Virilio, I see grave concern, even strong censure, but not outright rejection. His position is to epistemo-technically question every technological product to reveal the accident in the technology, and not just focus on the hype of what it can achieve. For Youngs, she surfaces the driving force in the economic system, that of inequality, and is highly critical of the contradictions between the message of empowerment and equality behind ICTs, and the resulting outcome, which shows the opposite.

Of the three, Haraway takes a more hopeful position through her cyborg in working productively with technology. Ontologically, the cyborg provides the hybrid metaphor to work against any totalising tendency for 'an essential unity' as this will help to survive the diasporas, particularly, for women in the integrated circuit. She is aware the cyborg is not innocent, but to reject its status is not possible as there is no going back, "ideologically or materially" (162). Haraway finds herself in an ironic situation borne of her time but sees hope there; she has a PhD in biology "made possible by Sputnik's impact on US national science-education policy" while being strongly influenced by the women's movement (173). This irony explains her strategic position towards technology. In clinging on to irony, she is saying, one does not have to give up hope, because "irony is

about contradictions that do not resolve into larger wholes, even dialectically, about the tension of holding incompatible things together because both of all are necessary and true" (149). In irony, is found "a rhetorical strategy and a political method" (Haraway 149). At the start of the thesis, it was stated that cyborgisation is an inevitable fact of modern societies, given the ubiquity and pervasiveness of ICTs. Total disavowal of the new technologies is not possible, and if that is the case, then irony may be the best approach to confront the oppression in the informatics of domination enveloping modern societies today. What is important is not to identify uncritically with the message of empowerment sold with every new development in technology, but to adopt Virilio's epistemo-technical questioning, while being consciously aware that technology benefits some bodies more than others. In that respect, it becomes ethically possible to embrace a politics of hope in Haraway's cyborg, ontologically and politically, for working towards "fundamental changes in the nature of class, race, and gender" in the emerging world order increasingly mediated by new technologies.

Some advice also emerges from Haraway's adoption of Chela Sandoval's oppositional consciousness, a strategy ascribed to 'women of colour' who are able to read the webs of power in the American system of oppression where they have been thrice discriminated for their colour, class, and gender, and have thrice triumphed over them. Sandoval's 'women of colour' has become a metaphor for the lessons from the history of the struggle of black women in the US, respected by Haraway, especially for the literacy acquired at great peril to their lives, "risking death to learn and to teach reading and writing" (175). The ability to write determines who has power if we look at history itself - who writes it and whose stories are told. To be a cyborg, one must be aware of this power of writing. As Haraway says: "Cyborg 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" (175). I quote Haraway, ten years after the Cyborg Manifesto, for a reminder:

> The global and universal are not pre-existing empirical qualities; they are deeply fraught, dangerous and inescapable inventions. (np) The cyborg is a figure for exploring those inventions, whom they serve, how they are can be reconfigured. Cyborgs do not stay still. Already in the few decades that they have existed, they have mutated, in fact and fiction, into second-order entities like genomic and electronic databases and the other denizens of the zone called cyberspace. Lives are at stake in curious quasi-objects like databases [...]. ("Foreword: Cyborgs and Symbionts" xix)

Haraway's cyborg opens up complex and critical ways to look at the productive tensions between the technological and the human, while at the same providing a strategic positioning in responding to the informatics of domination. We will next explore what kind of cyborg ontology and politics exists in iN2015.

Chapter Two

Becoming cyborg in iN2015

When the 10-year infocomm plan was launched in June 2006, the press release proudly declared, "Singapore iN2015 master plan offers a digital future for everyone" (IDA Press release 20 June 2006). IDA was keen to convey the impression that the master plan was not just their brainchild, but a 'private, public and people sector co-creation' resulting from many discussions with stakeholders and focus groups. The iN2015 master plan came a year and three months after the Infocomm Technology Roadmap 5 report was launched at a symposium in March 2005 attended mainly by industry players, business leaders, and IT professionals. Ten sub-committees, three focus groups, and two working committees were set up, with members selected by IDA to discuss Singapore's technological direction based on the ITR5 report.[14] The public, albeit mainly school children, was engaged through the Express IT iN2015 competition to draw ideas on how they imagined IT would impact the future in 2015. The iN2015 report was the culmination of all these activities; its final summary formed Singapore's fifth and latest ICT policy released in June 2006 by the iN2015 Steering Committee.[15] While iN2015 is an economic blueprint with concrete goals set for the infocomm industry and its usage (see page 8), it is also a futurological policy document projective of desires for an idealised future. A constant refrain running throughout the report is how our lives will be enriched and enhanced with new technology. How iN2015 envisage lives becoming richer and more meaningful will be reflective of its aspirations for the techno future. With

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[14] These committees and the members can be found in Annex C of its report, p.123-143.

[15] The iN2015 report comprise seven reports focusing on key economic sectors and three reports on how the infocomm industry can be grown and how infocomm could support the needs of the other economic sectors. All reports are available on the IDA website.

the cyborg future planned for everyone, what does it mean to become a cyborg in iN2015's brave new world ahead of us? What are the desires of the iN2015 cyborg based on? One way in finding out is to examine the use of language, metaphors, and imagery of how the techno future is marketed. Two IDA marketing videos, both available online and even promoted on YouTube, have been produced to market the iN2015 future. The first, titled "iN2015<Imagine Your World", was produced in 2006, and I will refer to this as the iN2015 video. The second video titled, "Next Generation National Broadband Network", made in 2008, was released with IDA's 2007/08 Annual Report, and I will refer to this as the Next Gen video. We look at the narratives in these videos to see how individual bodies, and whose bodies, are 'enriched' and 'enhanced' in *intelligent nation* Singapore. To analyse the ontology and politics of new technology under iN2015, the Singapore situation will now be foregrounded with references to other scholars for their writings on Singapore.

2.1   Imagining the cyborg future in iN2015

We begin with the iN2015 video. The protagonists are a normative middle-class Chinese family consisting of three generations, parents, two children, and a grandparent. The story is one day in their lives, which happens to be mum's birthday. Mum is Nancy, a digital animator, and she is seen at work, in a power-suit, video conferencing with her international non-English speaking clients. As each client speak, she/he is being simultaneously translated into Nancy's earpiece. When the videoconference is over, Nancy whips up her wristwatch that becomes a Next Gen mobile device and emails a message to order a taxi for son, David, to be picked up from the zoo. Sazali, a male Malay taxi driver, receives her instructions on his Next Gen mobile computer. Next, we meet Tobey, a male Caucasian expatriate executive, newly arrived in Singapore, at his new

apartment, unpacking. He is speaking to dad who is called Mark, a logistics manager. Together, they discuss work, communicating wirelessly through Tobey's Next Gen sunglasses and Mark's Next Gen car front window screen that acts as a computer screen. When they finish, Tobey calls up his avatar on his Next Gen sunglasses. She is an alluring Chinese female, his personal secretary, who attends to his work *and* personal schedule. She updates him on his favourite show playing at the Esplanade, and books tickets for him. Cut to Mark navigating in town looking for a parking lot. Suddenly, an email message flashes on his car front window computer. It's Tobey inviting him for the Esplanade show. Cut to son David who's at the zoo, busy snapping pictures of the animals with his Next Gen computer. Mid-day, he emails his professor with a question about rhinoceros, and the professor immediately shows up on David's screen with an answer. Cut to daughter Karen introduced as a teenage consumer, shopping for mum's birthday present. She carries a Next Gen device that flashes out the discounts on offer in the shopping mall and directs her to the specific counter. Cut to grandmother Lee exercising at home. Her heart skips a little too fast and it triggers an alert on her wristband device to her doctor who immediately appears on its screen to attend to her. Before the happy day ends, the family gathers for the evening meal, celebrating mum's birthday. Presents are offered, and the son surprises everybody with his immersive virtual reality projection in the living room of the zoo scenes shot that very afternoon.

The iN2015 video shows everyone using a Next Gen device that enhances their everyday experience, whether it is work, learning, at play, exercising, or shopping. Everything works effortlessly, and everyone is totally at ease using the futuristic devices that are gossamer light, nearly invisible, and worn or used close to the body. Seamless connectivity and interactivity also exist between all these Next Gen devices that talk to each other without any glitches. We see expatriate Tobey walking around in his new

compartment in his dark computer screen glasses, not bumping into things, while having an online video conversation, all at the same time. Dad Mark drives around town effortlessly while he uses his front car window as an interactive computer screen. Grandma's health can be monitored 24 hours round the clock via her wristband device, suggesting a doctor on call, anywhere and anytime. Shopping for the teenage daughter is totally stress-free, facilitated by technology. The iN2015 future is, unquestionably, a technotopia: a flawless technical world, behaving perfectly at the command of humans who are fully in control and at ease using technology. It disregards the real world of technology where hitches and glitches happen, protocols and standards between operating devices are different, let alone different generational models of technology that keep changing, impeding the smooth and seamless connectivity that is marketed in the videos

If a cyborg is a human being enhanced in some way by new technology, we see the iN2015 cyborg in the video as a media savvy consumer and user of new technology. Apart from the consumption of technological tools, identities and social relations in the future of 2015 remain totally unchanged. The three-generation middle-class Chinese family and the Caucasian expatriate are seen using all manner of Next Gen gadgets. The other non-Chinese is Malay and he is a taxi driver. Both husband and wife work, but it is wife who attends to son's schedule. Reinforcing yet another gender stereotype, technology for females is about enhancing the shopping experience, as seen with the teenage consumer daughter. iN2015 views technology empowering men differently from women, further confirmed in the scene of the Caucasian expatriate with his attractive Chinese female secretary transformed into a virtual reality persona. She does not have a name and answers to his command of 'avatar'. The woman here is presented as a technical object to fulfil male fantasies, and if this is not already offensive, it is made worse playing up the Orientalist trope of the exotic East (its women) for the colonising

white men. There is a double image of empowerment for the man (and disempowerment for the woman) based on race and gender. That this colonial trope has been adopted for the brave new world of iN2015 and endorsed in a government video made available on the world wide web, only demonstrates the unconscious internalisation of, and therefore, more insidious adherence to, patriarchal values. From the iN2015 video, it is clearly shown that new technology enhances bodies differently; some bodies more than others, with the class, race, and gender tropes continuing to hold sway. We look next at the Next Gen Broadband video, produced two years later, in 2008, to see if the narratives have changed.

In this Next Gen Broadband video, the protagonists are again a normative middle class Chinese family of three generations – the parents, one son, and grandfather. There is a twist to the profile of the couple. This time, Jack, the husband works as a 3-D animator. He is wheelchair bound from an accident, but this has not deterred him from leading a fruitful and meaningful life, he cheerfully declares. Happily married, beautiful wife, lovely kid, a successful career and a member of the Para-Olympics national team, he asks proudly: 'What else can I ask for?' Cut to grandfather Tan who has a serious diabetes problem. While watching TV, Tan is reminded by a message on screen that it is time for his weekly check-up with his doctor. He checks in with his doctor, and we witness telemedicine in action with the doctor examining his tongue in real time through an Internet video exchange. Then Tan goes out to lunch with friend Murthy. At the restaurant, they are served immediately on arrival because Tan had earlier ordered their food by email. Meanwhile, beautiful wife of Jack, a homemaker, is out shopping in a shoppers' paradise. Instead of having to walk the whole of Orchard Road, she can call up items virtually from any shop and superimpose these on her image in a shop's computer mirror screen. While wife is shopping, Jack is busy at work at home. He communicates

online with free-lance female IT expert, Raini, who tells us that she has since returned to work after staying home to take care of her third child. Cut to Jack's wife (she has not been given a name), back home, house-hunting virtually at the computer. She communicates online with Siti, a real estate agent cum stay-at-home mum. Siti is also happily cleaning window and ironing clothes at home. She thinks aloud of the wonders of broadband connectivity taking her places without leaving home and allowing her to be a full-time mum. Cut to David downloading his finished project swiftly meeting a client's urgent deadline ahead of schedule. He exclaims: "With such support and technology, I feel that I have swapped my wheelchair for wings!"

The purpose of the Next Gen video is, obviously, to show how lives are enhanced with high speed broadband when huge quantities of data can be transmitted over Internet. We can work easily from home, visit the doctor virtually, shop stress-free, order our food ahead of our arrival at the restaurant, go house-hunting online, and obtain whatever information – text and video data - anytime and anywhere. This Next Gen video, as in the iN2015 video, sends out a similar message: infocomm brings great ease and convenience, as we become media savvy users and consumers of new technologies living our lives virtually. As in the iN2015 video, technology works flawlessly and seamlessly. In terms of narratives on social reality, many themes from the iN2015 video are replayed, but on gender roles, the stereotypical portrayal of males and females in the technology landscape has regressed. Jack's wife has the luxury of not working and spends the day shopping, compared to Siti and Raini (are these non-Chinese women also single parents, we wonder?). Work culture is represented showing that when men work, they only have work, whereas if women work, they also have to cope with both family and domestic matters. In this video, Siti, the real estate agent, works from home, plays mum, irons and cleans house. Raini, an IT professional, re-enters the workforce, but only after taking time

to look after her third child. Technology clearly means different things to the different genders. Technology for women allows her to work from home (if she has to work) but mainly to support her role as mother and homemaker, whereas technology for men is about empowerment and enhancing capabilities. When iN2015 proclaims that infocomm drives limitless possibilities "to help us become creative and to enjoy life" (iN2015 34), we wonder who are the ones who can be creative and enjoy life. Jack's wife shops and house-hunts on the internet, while Siti and Raini work from home and cope with housework and children; scenarios sadly replicating the traditional sexual division of labour in the brave new world to be of 2015. In both videos, female identity has been further essentialised as die-hard shoppers shopping for cosmetics and clothes. Whereas with David, technology empowers on three levels: it provides for a profession as a digital animator; it allows for working from home; and it facilitates an active sporting life. Technology does not just help David to cope with his disability; it truly enhances his capabilities to lead a productive and meaningful life. Technology for men empowers in Amartya Sen's sense of enhancing an individual's capabilities with the positive freedoms to be or do something.[16] Why isn't the same imagined for women? This contradicts the report when it proudly declares: "By removing the tedium of routine work, for example, people will have more time to dream up the new and different" (iN2015 34). In the two videos, the sexual division of labour that penalises working mothers, the comfortable beneficence of pro-family conservatism, technology empowering the already privileged, and sexy female avatars fulfilling male fantasies, are all issues of class, race, and gender,

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[16] In his book, *Development as Freedom*, Sen develops his concept of positive and negative freedoms. Positive freedoms are substantial freedoms that are real opportunities to pursue personal and social goals. Negative freedoms are non-interference rights that can be summed up as freedom from coercion, such as freedom from murder, rape, enslavement or kidnapping. The examples in the videos show that technology for women can be viewed as kind of negative freedom in the sense that they have freedom to work from home but they continue to have to look after children and the house, whereas the men have positive freedoms provided by the new technology to actualise their potential.

which persist and are entrenched in the iN2015 vision. Technotopia is meant for some cyborg bodies based on class, race and gender differences, more than for others.

In iN2015, cyborgian technologies enhancing lives mean citizens are obliged to be media savvy users and consumers of Next Gen devices to cope with living in smart sentient spaces, that is, if they can afford the high tech homes and their devices in the first place. When the Media Development Authority (MDA), an agency of IDA, the government agency tasked to implement the iN2015 mission, organised the inaugural Media Fiesta in March 2009, it was part of the government's efforts to "promote media literacy and cyberwellness in an age when Singaporeans have more quality content choices than before" (Singapore Media Fusion e-newsletter. Issue 23: 26). Held at a downtown shopping centre, the main events consisted of introducing the latest video games, animation features, and made-in-Singapore TV shows; hands-on trials at interactive sites such as the national newspaper youth website STOMP; and an exhibition that explained film content classification and the key role played by the community in regulation. We are reminded of the vision of iN2015 – to give "every individual and endeavour seamless access to intelligent technology – and with it – the capability to take charge" described as "the new freedom to connect, innovate, personalise and create" (IDA website). According to MDA's Media Fiesta, media literacy can be summed up as: keeping abreast on the media scene for the latest video game or a locally produced TV show funded by MDA; deepening the consumer experience of interactive digital media; and understanding government's rationale for censorship and classification. The need to be media literate is, thus, driven primarily by consumption needs, while keeping within the bounds of societal and governmental regulations.

In the cyborg future of 2015, it would seem that lives are enriched and enhanced as media savvy consumers of technology, living lives with more ease and convenience,

while identities and social relations based on class, race, and gender remain unchanged. Clearly, the iN2015 cyborg is one-dimensional with its empowerment purely driven by consumption, making it primarily a media savvy user and consumer of new technologies. In contrast, Haraway's cyborg strives for a post-gender world, which moves away from gender, race, and class as a basis for establishing essential unity. In other words, ontologically and politically, in Haraway's post-gender world, people are not assimilated, compartmentalised, marginalised, or essentialised by their gender, race, class, even sexuality, or nation. These categories, she reminds us, have been forced on countries, peoples and individuals, "by the terrible historical experience of the contradictory social realities of patriarchy, colonialism and capitalism" (155). In the informatics of domination of present times, these categories have not disappeared but have been glossed over by the veneer of the empowerment message in technology or, as Youngs highlighted, the ideology of progress embedded in technology. When peoples and worlds are reduced to become information processing units, socio-political problems also become translated as 'quantifiable data' and 'problems in coding'. iN2015 has bought completely into technotopia and the ideology of technology as progress in Singapore's pro-business, pro-consumer environment, but the island-state is not inoculated from the negative fall-out of the intense cyborgisation processes that Haraway, Virilio and Youngs speak about. The thesis would now like to discuss two particular issues in this negative fall-out of the cyborgisation process that undermine the iN2015 vision of a digital future for everyone. The first deals with gender and the other with inequality.

2.2   The gendering of iN2015

The cyborgian future imagined in 2015 in the IDA videos is frightfully gendered where the binary relations of gender identities are reinforced. When it first appeared,

Haraway's cyborg was seized by feminists as a new way for rethinking the body because it shook the biologically deterministic formulation of being female. How much has her cyborg changed the world, particularly, of the structured social relations of science and technology, which the cyborg was then addressing? In an interview twenty years after the Manifesto, Haraway admitted that the world has become "ferociously gender-in-place" (Gane 137), a description that also applies to the iN2015 scenarios in the IDA videos. Technology and gender as a subject has a long and vast history that is beyond the scope of this thesis. Instead, the thesis will confine the discussion mainly to statistical evidence of the relationship between technology and gender in Singapore to see what it reveals. First, we need a preamble to frame why gender is a crucial issue with regards to the increasing use of ICTs in Singapore.

When we see all the Next Gen gadgets and new technology featured in the videos, such as the wearable computing devices and the use of smart sentient technologies, the question of who decides, who researches, who designs, who engineers, looms large. A report from the United Nations Development Programme (UNDP) in its work on women empowerment in developing countries helps to explain why this question is important. The United Nations rank ICT as the third most important issue facing women globally, after poverty and violence, and gender as a major factor in determining who has access to and who benefits from ICT. It reports many barriers to women's access to ICTs, pointing out that the ICT industry is uniquely male, women are disproportionately represented among the information poor, and women are "nearly absent as substantive producers of technology or content, much less as decision makers" (para 4).[17] The UNDP concludes

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[17]The United Nations Development Programme, in its work on women empowerment, adopts the strategy of gender mainstreaming, which is to effect changes in mainstream policies and resource allocation reflecting the interests and views of women as well as men. The major lesson learnt from the slow progress in achieving real change in the situation of women despite efforts over two decades is that significant change cannot be achieved by adding marginal programmes for

that to see technology as gender-neutral entrenches inequality, which enlarges the gender gap making ICTs actually 'gender-negative'. Where does Singapore of first world status fit into this general description of technology and the gender gap that prevails in developing countries? We look now at some of Singapore's statistics.

From the latest statistics for the period of 2002 to 2006, females make up generally half the number of males enrolling and graduating in information computing courses at tertiary level (see Chart 1 on page iv). This same ratio persists in employment. From 2005 to 2008, females persistently make up only half the male workforce in the infocomm industry (see Chart 2 on page v). When we look at occupation and decision-making positions in the IT world, the gender picture becomes even more skewed. While females have nearly caught up with males as technicians or associate professionals, females lag behind the males more than twice the number as managers or senior officials, working proprietors and professionals, while a large proportion of females work as clerical staff.[18] Considering that Singapore's ICT plans were rolled out as early as 1981, early enough to get more women into this field by the 21st century, the statistics show a stubbornly male dominated ICT world. The information age has been expected to benefit women because the ICT world does not require the application of physical labour and strength. So why are we not seeing a more balanced gender representation in the ICT world?

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women. Work on gender mainstreaming in developing countries can be found on the UNDP website under the link on women's empowerment.

[18] These figures were compiled from the gender disaggregated data for employed residents in Information and Communications distributed by occupations from the 2007 Labour Force Survey, submitted in "Singapore's Fourth Periodic Report to the UN Committee for the Convention on the Elimination of all Forms of Discrimination Against Women. November 2008." by the Ministry of Community Development, Youth and Sports. Table 40 contains the relevant data and is reproduced in the Appendix of the thesis on pages 106-108.

Singapore acceded to the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) in October 1995. This legally binds Singapore to implement the provisions of the Convention. Singapore, through the Ministry of Community Development, Youth and Sports, is committed to submit national reports at least every four years on measures taken to comply with their treaty obligations. Since 2000, four reports have been submitted, with the latest in November 2008. In this 2008 report, ICTs have been mentioned but only under the article on education detailing Singapore's ICT master plan for primary and secondary schools. No gender related concerns with ICT were raised. It is, thus, not far-fetched to say that technology in Singapore is viewed as gender-neutral, which actually means being gender-blind to the inequalities embedded in technology.

The gendering of technology in Singapore is further complicated by the fact that conscription called National Service is compulsory for men and not women. Implemented in 1967, all male Singapore citizens and second-generation permanent residents upon reaching the age of 18 have to serve two years as full time National Servicemen mainly in the Singapore Armed Forces. After these two years, the men continue their training annually for a shorter stint until the age of 40 or 50 depending on their rank. The Singapore Armed Forces has been transforming itself and training its servicemen to become the Third-Generation (3G) force, tapping on ICTs to turn into a network-centric and knowledge-based fighting power. Such experience keeps men anchored in the world of technology. The subject of conscription for women was raised on many occasions, notably by the Association of Women for Action and Research (AWARE)[19], but the government's response has always remained the same: Singapore

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[19] AWARE is Singapore's only feminist organisation formed in 1985 as a women's rights advocacy group.

society is too conservative to accept such a drastic social change. National conscription will continue to foster women's exclusion from the world of technology that is essentially a male and masculinist domain in Singapore. So how can change take place?

If we look at the Singapore situation, women's access to education and economic opportunities is the envy of many countries in the region, and many have succeeded in careers of their choice. While many individual women have broken through the proverbial glass ceiling in their fields, the statistics tell something else about the big picture. The World Economic Forum (WEF) tracks a gender gap index, where the value of 1 indicates full equality between men and women, and 0 means total inequality. Its Global Gender Gap Report 2009, released in October, saw Singapore registering a marginal improvement in its score that climbed to 0.666. But this is no consolation considering Singapore's ranking at 85 out of the 134 countries. Last year's was 84. In these two years, Singapore's ranking has worsened quite significantly compared to 2007 (77th position) and 2006 (65th). Tackling the gender imbalance in Singapore is not helped when women themselves have found class equality with the men through education and employment, and become gender-insensitive. When the first woman permanent secretary, Ms Lim Soo Hoon, was promoted in 2000, she made it clear she was no feminist and that her career was "ample proof of her own conviction that there is no glass ceiling for women in the civil service."[20] The counter question that should be posed is: why has it then taken so long to promote a woman to run a ministry? In March 2009, the first woman minister was appointed in Mrs Lim Hwee Hua. The Prime Minister Lee Hsien Loong, in announcing the promotion, commented on the gender imbalance in politics, saying: "It's just the way

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[20] "A Top Woman Mandarin, but She's No Feminist." *Straits Times* 3 Mar 2000.

things turn out, particularly in politics, that there are more men than women."[21] A similar reply is most likely expected to explain the persistent gender imbalance in IT education or employment. Mrs Lim also made it clear who should be given the credit for the greater female representation in Parliament. She said: "It is really through the vision of the men who were in charge […] Most of us came through because we were identified by the leaders who were men."[22] If women leaders cannot see the gendered socio-political world, then any likely change will only come from the men in power. In the patriarchal state of Singapore, this change will not come fast. Christine Doran and Jim Jose highlight the contradiction in the position taken by Singapore's PAP government that rejects feminism because it is a western import. On the one hand, the government "supports wholesale adoption of western economic thought, business practices and consumer culture", and I must now add, modern ICTs, but on the other hand, "when it comes to dealing with women's issues, any idea that might threaten men's power is deemed to be un-Singaporean, and the PAP suddenly finds value in the 'local' rather than the 'global', the 'authentic' rather than the 'imported', the 'traditional' rather than the 'modern'" (Doran and Jose 227). The gender issue is, of course, related to another issue that seems to be worsening in our cyborgian times and, that is, the persistence of inequality.

2.3   The statistic that is here to stay

In an international cross-country comparison over 1990 to 2000, the four 'tiger' economies and the United States showed a widening disparity in overall household income (see Chart 3 on page vi). Looking at Singapore's situation taken from the 2000

[21] Kian Beng Kor, "Lim Hwee Hua Promoted on Merit, Not Because of Gender." *Straits Times* 31 Mar 2009.

[22] Chee Kong Loh, "More Women to Be in Politics." *Today* 3 July 2009.

study[23] by the Department of Statistics, its Gini coefficient[24] rose steadily from 1990 to 2000 (see Table 1 on page vii). In this same study, the other measures of income inequality also confirm the growing disparity in household income. Economists prefer to use the top and bottom 20% of the average income of households for a less skewed picture of income distribution than the 10% top and bottom figures. If we look at the ratio of the household income in the top 20% to that in the lowest 20% in Table 1, the ratio rose from 11.4 in 1990 to over 20.9 in 2000. If we look at income share, the earnings of the top 20% rose from 48.1% in 1990 to 51% in 2000, while that of the bottom 20% dropped from 4.2 to 2.4%. During this period 1990-2000, the much faster income growth for high-income earners has, thus, been accompanied by rising income disparity. This study attributes the widening disparity in Singapore to the transition to a knowledge-based economy, observing the same phenomenon in Hong Kong, South Korea, Taiwan and United States (6). More recent data continue to report the same trend of greater income disparity (see Table 2 on page vii). In this second table, the Gini coefficient rose from 2000 to 2007 and decreased slightly in 2008, but when 2000 (0.444) is compared to 2008 (0.489), the Gini index shows an overall worsening trend. From this report, the ratio of the average income of the top 20% to the bottom 20% shows a 10 times earning capacity in 2000 increasing to 13 times in 2008.

The digital divide has been discussed as a reflection of existing socio-economic disparities, with Youngs asserting that the digital future is a highly unequal one. The

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[23] This study titled "Income Distribution and Inequality Measures in Singapore" was presented at the Chinese Populations and Socioeconomic Studies: Utilizing the 2000/2001 round Census Data conference. Held at Hong Kong University of Science and Technology, 19-21 June 2002.

[24] The Gini coefficient measures the income distribution, and is often used as a gauge of the income gap for comparison over time. It takes a value between 0 and 1; with 0 showing perfect equality where everyone has the same income, and 1 as perfect inequality where only one person has all the income and everyone else has zero income. If the Gini coefficient rises over time, it means income distribution is becoming more unequal.

digital divide often refers to inequalities in access and affordability to ICTs, such as the Internet, personal computers, and cell phones. iN2015 views infocomm as a "powerful leveller to build a digitally inclusive society and enrich all lives" (iN2015 101). It actually believes it is possible to close the digital divide and to ensure that no one is left out, the elderly, the disabled, and the needy, have been identified as target groups to educate, train, and help with subsidies. Inspite of its good intentions, such an outlook fails to see that ICTs introduced in an unequal world could themselves be reinforcing existing inequalities while introducing new inequalities. Granted, more and more Singaporeans now own computers and are getting connected and at faster speeds as the island gets wired up under the nation-wide fibre optic infrastructure. But the discussion of the digital divide has now moved from inequalities in basic 'quantity' and access to ICTs to differences in the quality of the user experience. Youngs highlights that the digital divide, more fundamentally, suggests how future divides in wealth may take shape, as ICTs increasingly determine the ability of individuals, firms, and nations to create future wealth. Randolph Kluver observes that while the digital divide in Singapore has some ethnic and socio-economic dimensions, it is not a question of access but rather about values. He states: "[…] any Singaporean who wants to go online has little difficulty in doing so. What divide that does exist is primarily attitudinal, in that large numbers of the lower educated, the elderly and lower socio-economic groupings see no real value to go online" (43). Tackling the accessibility issues might solve a quantitative aspect of the digital divide but hides a crucial dimension in terms of its qualitative experience. There is a big difference between using the Internet to keep in touch and using it for generating business opportunities and social networking. Believing that ICTs could be a leveller of inequalities may end up ignoring why not everyone wants to be connected, as observed by

Kluver, or what being connected really means in qualitative terms for each and every person.

In a high-tech economy of iN2015, lowly positions handling data entry and processing tend to be fulfilled by women. In the IDA videos, the cyborgian labouring body, such as the women in the integrated circuit, is conspicuously absent. iN2015 proudly celebrates the concept of "Infocomm Unlimited" so that we can become "more creative and to enjoy life" (34). But who will be working in the microelectronic factories, or doing the manual and routine work that are not technologically skilled, but which keep the economy and the society functioning. During the 2009 economic downturn in Singapore, lowly-educated women, in their 50's, seeking jobs as cleaners, were asked to email their resume to a recruitment database repository.[25] The situation makes a mockery of poor, uneducated women who have neither the resources, nor the need for IT skills in their lowly paid jobs. The move to get everyone connected and IT-savvy ends up penalising these older, lowly educated, and poor women (and men). We are thus reminded of Haraway's feminization of poverty in the homework economy, that one can be employed and still poor.

With global inequalities persisting, Youngs has argued there is now enough evidence to demonstrate that it is inequality that is actually driving growth and development. The conventional wisdom on economic growth and inequality belongs to the school of trickle down development. According to this school, "the vertical flow from the rich would happen of its own accord" (Kakwani and Pernia 2). The rationale is that the rich will benefit from the first round of economic growth, and when they begin to spend their gains, this generates the second round of growth that will then benefit the poor. In other words, the poor will benefit from economic growth indirectly as a vertical

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[25] Serene Luo, "Wiring the Blue-Collar Workers for the IT World," *Straits Times* 7 July 2009.

flow from the rich, even if they benefit proportionally less than the rich. Proponents of trickle down development believe that poverty will diminish with growth even if the poor receives a small proportion of total benefits (ibid 2). The trickle down development argument has been seductively persuasive, given the examples of Singapore and the other Asian tigers, Hong Kong, South Korea, and Taiwan. These Asian tigers have stunned the world with their high and sustained economic growth over four decades to emerge as advanced and high-income economies in the 21st Century. The concentration of income at the top is actually seen as a spur to improving living standards. The arguments have been succinctly summarised by economics writer John Ravenhill. On one side of the argument, "inequality provides incentives for effort and risk-taking, and therefore spurs efficiency and productivity, the gains from which will trickle down. […] So those who worry about inequality are just practising the 'politics of envy'" (Ravenill 401). The other side of the argument refutes the conventional wisdom of considering 'efficiency' and 'distribution' separately and argue that policy recommendations should not be based entirely on efficiency (ibid 401). Weighing up the two opposing viewpoints, Ravenhill concludes, "most economists are not much bothered about income inequality provided markets are free, because they buy into the belief about inequality as the main source of incentives" (401).

Singapore's development model is clearly premised on the trickle down theory. Its economic growth continues to impress, but inequality statistics have stubbornly persisted. The United Nation Development Programme has been tracking members' socio-economic development since 1980 through the Human Development Index and compiling the results in their Human Development Report since 1990.[26] Singapore's HDI has been

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[26] The Human Development Index (HDI) is a composite measurement of three dimensions of human development: life expectancy, literacy and educational attainment, and GDP per capita - taking values between 0 and 1. The three dimensions of the Human Development Index are:

improving since 1990, and the latest Human Development Report 2009 ranks Singapore in 23rd position out of 182 countries with its HDI of 0.944. As a comparison, the US is ranked in 13th place with its HDI of 0.956. The Human Development Report also tracks other data to monitor progress over time within as well as across countries. One of the data is the Gini index.[27] Singapore's Gini index has crept up as the second highest amongst developed countries, after Hong Kong and before the US. Among the top 30 HDI-ranked countries, three countries, Hong Kong, Singapore and the US, are the only ones scoring more than 40 for its Gini index. Hong Kong, the highest is 43.4, followed by Singapore at 42.5 and the US at 40.8. As a comparison, Denmark, the lowest among the 30, has a Gini index of 24.7.

While Singapore looks up to the United States as a leading example of an information society and a knowledge-based economy, it has actually beaten its role model at the inequality stakes. If the UN Gini index ranking is compared with HDI values, a sense of the inequality problem across the vast divides of the global economy becomes even more revealing. The US's Gini index of 40.8 is the same as Ghana positioned 135th in its HDI ranking of 0.533. Singapore's Gini index at 42.5 is the same as Kenya whose 148th HDI position is 0.532. What this means is that high-income countries, like United States and Singapore, can have high-income disparities with the scale of inequality higher than medium or low-income countries. Singapore can thus be described as having first world income but third world distribution.

2.4   Meritocracy, equality and technology

living a long and healthy life (measured by life expectancy), being educated (measured by adult literacy and enrolment at primary, secondary and tertiary level) and having a decent standard of living (measured by Gross Domestic Product per capita at purchasing power parity in US dollars). The HDI was introduced since 1990.

[27] The Gini index is the Gini coefficient expressed as a percentage; as with the Gini coefficient, the higher the Gini index, the more unequal the distribution.

Singapore's model of economic development can be described as techno-capitalist, a term developed by Douglas Kellner to designate the knowledge-based post-industrial capitalist economy. Techno-capitalism signifies the latter-day development of capitalist society in which advanced technology and scientific knowledge replace the former crucial factors of labour and machines in the processes of production, producing "new modes of societal organization, and new forms of culture and everyday life" (Kellner 178). The paradox of techno-capitalism lies in its form of "both progress and of domination" (Kellner 182). Progress, as Kellner explains, because it produces new technologies and modes of information that have a potentially beneficial impact on human life, but also domination because "it forfeits many of these potentialities by employing new technologies primarily as a continued imposition of commodification and wage labour which exacerbates class inequalities while intensifying misery and suffering for millions of people throughout the world" (182). Techno-capitalism aptly describes Singapore's development model. Behind the impressive growth rates and growing per capita income, cyborgisation in techno-capitalist Singapore is aggravating growing socio-economic disparities. The economic growth model premised on inequality is further exacerbated by another sacred cow behind the Singapore government's policy-making: this is the state's founding principle of meritocracy.

The principle behind meritocracy based on ability is well accepted. Merit-based selection must be blind to gender, sexuality, age, or class differences, but ignoring these differences, Kenneth Paul Tan maintains, may serve to deny their real influence on the prospects of candidates. In his study of meritocracy in Singapore, Tan argues that meritocracy, in practice, is often transformed into an ideology of inequality and elitism (8). He elaborates:

> Meritocracy, in trying to 'isolate' merit by treating people with fundamentally unequal backgrounds, as superficially the same, can be a practice that ignores and even conceals the real advantages and disadvantages that are unevenly distributed to different segments of an inherently unequal society, a practice that in fact perpetuates this fundamental inequality. (8)

Hence, if relevant social differences are hidden beneath "an uncritical, even celebratory, rhetoric of meritocracy" and "a blindness to difference", then meritocracy itself becomes an ideology of inequality (Tan 8). The United States is cited as another example of a meritocratic society but with egalitarianism on the decline (Kenneth Arrow as quoted in Tan 9). Both Singapore and the US, as we have seen, are showing worsening Gini indices. Meritocracy, "ostensibly anti-elitist", also becomes an ideology of inequality through co-option by the winners, who become an elitist, "self-conscious, exploitative ruling minority" bent on perpetuating their power and prestige (Robert Klitgaard as quoted in Tan 10). Success can also depend on other factors, such as "inheritance, marriage ties, social connections, cultural capital, opportunities arising from developments in the economy and plain luck" (McNamee and Miller qted in Tan 10). When meritocracy is practised to an extreme in a maturing society like Singapore, Tan contends, these factors become obscured.   The practice of meritocracy entrenched as a state ideology in Singapore makes it difficult to bring up issues of disparities along class, and especially race and gender. In the case of gender, we have seen how female leaders themselves deny the need to be gender sensitive in the political power hierarchy. To cry 'gender' would seem like admitting to an inability to perform based on pure merit. The state practice of meritocracy in a knowledge-based economy predicated on inequality will witness greater

not lesser socio-economic disparities along the class, race, and gender hierarchies that have long been in existence, and which do not seem to be abating.

Tan's critique of meritocracy producing the opposite of its intended outcome follows similarly the logic in Youngs' argument that liberalism and its economically driven form, neoliberalism, have reached a watershed with regards to its utopian vision of equality and equal rights. Youngs points to an extreme mismatch between theory and practice, whereby the burden of practice, that is increased inequality despite greater overall economic development, is threatening to jeopardise the theoretical pretensions to the goal of equality. Similarly, the same caution is raised regarding the utopian aspirations of iN2015 of infocomm as a leveller of inequalities.

In Aihwa Ong's analysis of Singapore's ambitions to be Asia's bio-tech tiger through building an ecology of expertise, she discusses how citizenship and its worth are becoming operable around specific knowledges, techniques and expertise (339). She quotes Nikolas Rose's example of the government's reconceptualization of citizenship as a mode of self-enterprise in neoliberal Thatcherite Britain, and under Tony Blair, the promotion of "technological citizenship that encourages citizens to be technologically informed as a way of engaging in public life" (339). A similar process appears to be happening in Singapore, Ong observes, with a recoding of citizenship ideals that entails transforming all Singaporeans into technologically informed individuals (344). Hence, citizens are repeatedly reminded of the need for computer training, constant retraining, and reskilling in order to survive in the new economy. In a cyborg state like Singapore, Ong raises pertinent questions on the meaning of citizenship "when those with technopreneurial skills can jump to the front of the line" (350), or when the new ethics base moral worthiness on foreign expertise (339). Billions of dollars of state money are bankrolling new R&D ventures with foreign research institutions and global companies;

money spent, it has to be said, which goes unquestioned in Singapore's political culture. This contrasts greatly with the smaller funds committed to welfare assistance for the thousands thrown out of work during the 2009 economic downturn.

What does Singapore's worsening income divide have to do with the IDA videos that this chapter began with? It is to be reminded of Haraway's informatics of domination prevailing along the class, race, and gender tropes that are being replicated in the iN2015 techno future imagined in the IDA videos. In concluding, iN2015 promotes a cyborg that is ontologically and politically one-dimensional, with its empowerment purely driven by consumption, making it primarily a media savvy user and consumer of new technologies. iN2015 enriches and enhance lives by attending mainly to the comfort needs of the cyborg, delivered by a seamless, flawless high tech environment. Ignoring the fundamental nature of ICTs in exacerbating the socio-economic and gender inequalities shows a total denial of the contradictions between the message of empowerment and its outcomes of inequalities. The failure to comprehend or to accept these contradictions comes from a technocratic frame of mind that sees these issues as technical problems requiring a technological solution and not political ones relating to social injustice. We turn to this technocratic frame of mind in the next chapter.

Chapter Three

Living in technicity

Cyborgisation under iN2015, as we saw from the last chapter, embodies different degrees of empowerment engendering different levels of privilege and exclusion based on the hierarchies of class, race, and gender. These differentiated processes of empowerment and disempowerment have become hidden because cyborgian technologies themselves are reified in a techno-capitalist economy, and their presence considered a natural state of affairs. They have also become hidden because cyborgian technologies require constant changes and adapting to these changes is now accepted as a norm of modern life. While the preceding chapter looked at the future imagined in iN2015 through its various marketing materials (the IDA videos and website), this chapter examines mainly the Infocomm Technology Roadmap or the ITR5 report that is driving the iN2015 vision. It will demonstrate that ITR5 is driven primarily by what is technologically possible and desirable, an outcome of a technocratic frame of mind that seems all problems as mainly technical ones to be fixed with technology, and how such a technocratic frame of mind necessitates the embrace of speed and constant innovation. Virilio's dromology is relevant for his study of "the importance of speed in history and, thus, of acceleration" (Virilio and Armitage, "From Modernism to Hypermodernism" 16), summarised in the statement: "history progresses at the speed of its weapon systems" (Virilio 68). For Virilio, speed is the crux of change in our modern societies. Speed, he defines, is an acceleration of a movement. As a phenomenon, speed itself is neutral; for example, it creates tempo and rhythms in music. But there are different kinds of speed, and Virilio uses his fist as an example: it can be a gentle caress, or it can deliver a bloody nose. The latter, the speed of "the bloody nose", is the kind of speed at work in society that he is

concerned about, which comes from the technology of war and its weaponry (Virilio and

Lotringer 45). Living in speed-space, where real time has superceded real space, Virilio

states: "we have become deterritorialised" (Virilio and Armitage,"From Modernism to

Hypermodernism" 17). He gives examples of deterritorialisation in the way we live our

lives today, "through mobile phones, through 'live' programming on TV, through

telecommunications media, through Virtual Reality, through cyberspace, through video-

conferencing, through supersonic air travel" (ibid 17). The state cyborg of iN2015

becomes addicted to acceleration inherent in new technology, living a life in technicity,

which is a hypermodern techno life suffused by a politics of 'disappearance' that ignore

the growing inequalities inherent in the cyborgisation process. This chapter examines this

life living in technicity driven by the ITR5 report.

3.1   Jumping on the broadband wagon

The broadband phenomenon best exemplifies Virilio's speed-space. Broadband

refers to a medium that allows data transmission on several channels all at the same time

and over long distances such as cable television. Different members in a household can be

on the telephone, download a huge music file, check email, play an online game, video

stream a movie, and surf a website, doing these activities all at the same time. Bandwidth

is the rate for data transfer measured as bit per second. When Internet first started, it was

kilobits per second, 56 to be exact, on dial-up connection using an analogue modem.

Today, it is Megabit speed (Mbps) ready to jump to Gigabit per second (Gbps) with

Singapore's Next Generation National Broadband Network (Next Gen NBN) built on a

nation-wide fibre optic infrastructure. Optical fibres carry light along its length. Instead of

transmitting data by electronics or microwaves, the signal is now transmitted by the use of

light through glass fibre. Wrapped in bundles, optical fibres can carry images at much

higher bandwidths and over much longer distances compared to the previous mediums of copper wires and coaxial cables. When Singapore's Next Gen NBN comes online by 2015, it will be difficult to resist signing up for more bandwidth if one is already hooked up. Most in Singapore are already connected with 76% of households having Internet access that is on broadband speed.

The iN2015 vision is to make broadband 'always-on, anywhere, anytime', while research is rapidly taking place to integrate the different telecommunication devices, such as the landline, the cell phone, and computer Internet through Software Defined Radio, allowing any of the devices to pick up wireless connection for communication. ITR5 predicts that Internet Protocol, the method or protocol by which data is sent from one computer to another on the Internet, will 'rule' the world and become the unifying platform for all the different telecommunication devices. When these two areas are resolved, the cost of bandwidth is expected to drop to a fraction of current costs, and unlimited bandwidth subscription is in the offing. 3G mobile broadband is on the next cusp to move to 4G technology that will allow data transmission at over 100 Mbps on the move and 1 Gbps stationary. ITR5 also predicts broadband from the home and office moving very quickly to broadband on the individual. By 2015, the ubiquity of very-short-range wireless systems will allow for personal area networks, wireless sensor networks, and even the body to become an area network, while Ultra-Wideband will enable high speed data transfer of 1 Gbps and beyond in close proximity to the user. With communications and computing converging with nano-technologies, ITR5 foresees a person carrying terabytes of storage around, declaring: "Just as the PC and Internet transformed our lives, when this threshold is crossed, our lives will never be the same again (Executive Summary 5). At our fingertips, will be "a walking office, databank, software and entertainment centre available wherever we are and at anytime we want

them" (ibid 2). ITR5 expects vehicles to have Internet access and become a mobile office and entertainment centre. When sentient technologies become commonly prevalent, ITR5 envisions closing the last inch for the Internet to connect to the real world in smart spaces. The IDA videos showed these future scenarios where wearable computing devices, sensors, and body area networks create smart individual spaces with seamless connectivity. ITR5 also speculates the Internet extending into the skin or body, if this is necessary, for the right individual in the right context. All these embedded computing interfaces and technologies "aim to help humans interface better with the digital world" (ITR5 Sentient Technologies 31).

The developments described above demonstrate what it means living permanently in Virilio's speed-space, where speed is no longer a means but a milieu characterised by instantaneity, simultaneity, and ubiquity. When the Semantic Web arrives, any object, including our bodies that can have a microprocessor embedded, can be wirelessly connected. The example given by ITR5 is the Internet connected microwave oven checking the maker's website for optimal cooking parameters. For such a future ahead of us, incredibly high broadband speed will be needed. Broadband subscription has become, tantalisingly, the "new conscription" (Bartram 290). Bandwidth intensive services and applications are, already, coming on stream such as Internet Protocol High Definition TV with its growing programme choices, creating the continual demand for more bandwidth. To be the state cyborg in iN2015, one would have to be armed with broadband speeds that are as fast as possible.

Broadband penetration is now treated as a key economic indicator of a country's development as ITR5 concludes: "Generally, countries with high broadband penetration levels also have high levels of gross national income" (Communications in the Future 2). Finland recently became the first country in the world to declare broadband Internet

access a legal right.[28] While the United Nations is pushing to make Internet access a human right with its legal adoption by countries, Finland has taken a step further by legally mandating speed of at least 1 Mbps. Defining broadband by bandwidth keeps shifting because of changing technology. Broadband started with 256kbps, while the International Telecommunication Union, UN's specialized agency for telecommunications, has defined broadband as having access speed of 1.5Mbps. At time of writing, the fastest nation, Japan, has speeds of over 90Mbps, followed by France and South Korea at over 40Mbps, and Sweden over 20Mbps. Comparing with the slowest end of the broadband spectrum, South Africa and China have access speeds of 1Mbps.[29] Having broadband adds a further layer to the existing global digital disparity because of access and affordability. Access to broadband services in low-income developing countries is restricted and very expensive. Only 5.5 % of the world population has fixed broadband access, with 74% of these subscribers from high-income countries. Mobile broadband is expected to take over fixed line broadband, especially in developing countries that lack reliable telephone line infrastructure. But the take-up rate is still much higher in wealthier countries, with 14% in the developed world against 0.9% in the developing world.[30] With average broadband speed around 8-10 Mbps and climbing upwards continually, Singapore belongs to the club of the broadband rich.

Singapore has received many accolades and awards in various ICT rankings, such as e-readiness, IT industry competitiveness, or ICT coverage, and these are proudly

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[28] "Fast Internet Access Becomes a Legal Right in Finland." *CNN* 15 Oct 2009.

[29] "Broadband speeds around the world." *BBC News*. 2 Dec 2007.

[30] UN's International Telecommunication Union collects the most comprehensive range of statistics on ICT penetration, accessibility and use. All these figures reported are obtained from their online publication "Measuring the Information Society – The ICT Development Index, 2009 edition."

displayed on IDA's website.[31] If the digital divide is measured in terms of accessibility

and affordability, Singapore ranks 7th in the world.[32] The iN2015 strategy to build

Singapore's Next Gen NBN, the nation-wide fibre optic broadband infrastructure, which

IDA boasts as the world's first, will deliver ultra-high speed bandwidth to every home

and building. Singapore's geography and size, of course, makes for easy diffusion of

ICTs. Two iN2015 goals aim to have every home with school-going children owning a

computer and at least 90% of all homes using broadband. These goals are well on their

way to being achieved. In 2006, 78% of households with at least one computer have

increased to 80% in 2008, and 71% with home Internet access have grown to 76% during

these two years. When it comes to telecommunication usage, the growth has even been

more phenomenal. Mobile phone penetration rate exceeded 131% in 2008 from 103.4%

in 2006. Home broadband exceeded 99.9% in 2008 compared to 62.8% in 2006, while the

number of broadband subscribers has shot up to 4,715,900 from 768,300 in these two

years.[33] The iN2015 mission is to develop a digitally inclusive society: "one which ensure

infocomm access and competencies for all" (iN2015 101). The government has certainly

gone out of its way in these effort, targeting those on the other side of the digital divide:

that is, the needy, the elderly, and the disabled. The NEU PC Plus Programme by early

2009 helped more than 2,700 needy households with school-going children with

computer and three-year broadband subcription costing as little as $300 per household.

Learning hubs for senior citizens called Silver Infocomm Junctions (SIJs) have opened to

equip senior citizens with digital lifestyle skills and knowledge. The government has also

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[31] This IDA webpage contains a list Singapore's accolades and awards for its IT rankings as well as the latest infocomm statistics.

[32] This ranking is based on 2007 data provided online by the International Telecommunication Union.

[33] These figures are obtained from IDA's latest Annual Report 2008/9, available online from their website.

planned computer clusters at 100 convenient locations over the next three years, which older people can use for free. For the disabled, the Infocomm Accessibility Centre (IAC) was set up in July 2008 to offer structured certification path for industry-relevant training, IT-related apprenticeship, as well as library facilities for assistive technology equipment. By default, everyone will not escape cyborgisation having to live in a cyborg society.

While these programmes are commendable in facilitating media access to many who would otherwise be cut off from cyberspace, the anxiety of speed and constant changes are inadvertently forced on everyone. The technological imperative driving the propulsion towards more speed in ITR5 has been based on macro technology trends, being watched and followed in the industry. These trends have been described as 'laws' and Moore's Law rules here.

According to Moore's Law, the number of transistors that can be placed inexpensively on an integrated circuit increases at a fixed rate. Intel co-founder Gordon E. Moore in 1965 predicted the rate to be exponential, doubling approximately every two years. Moore's Law is therefore not a naturally occurring law but a prediction based on an observation. The more it became widely accepted, the more it turned into a goal for an entire industry. Moore's law, thus, became a benchmark for competing electronics industries as well as scientists and engineers in the field of semiconductors to work towards achieving the specified increase in processing power. Moore himself admitted the 'law' has become a self-fulfilling prophecy as companies rushed to keep ahead.[34] Since 1965, the trend has persisted, and is expected to continue till 2015.

ITR5 also accepts another five 'laws' of technology and quotes these in their report. Disk law states storage doubles every 12 months; Fibre law predicts communications doubling every nine months; Metcalfe's law forecasts that the value of a

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[34] Jo Twist, "Law That Has Driven Digital Life." *BBC News* 18 Apr 2005.

network increases by the square of the number of devices connected to it; and lastly, Community Law states that content increases 2^x, with x being the number of people. Like Moore's Law, these are not laws of physics, ironclad and empirically founded, but predictions, even speculations, which are being treated almost as factual.

Complying with these macro trends would mean forcing perpetual technological change in our environment. Bernard Stiegler, who uses the term 'technics' from the Greek word *tekhne*, talks about the specificity of modern technology, which resides essentially in its speed of evolution (27). This leads to conflating the question of technology with the question of time, whereby Stiegler concludes, "technics far from being merely in time, properly constitutes time" (27). Technology has, thus, now entered a state of permanent innovation and the driver is speed itself. The pursuit of speed and constant innovation are valorized as unquestioned and unquestionable (Bartram 289). The more we value speed in the drive for technological progress, the more we fall into the trap of technological determinism, where technological change is accepted as an independent factor impacting society from outside of society. This implies, as mentioned earlier, a passive rather an active attitude to technological change: one that adapts to rather than shaping technological change. The technology of speed warrants an examination of a political economy of speed, which we will now discuss.

3.2   Chronopolitics or the political economy of speed

Virilio agitates for an urgent analysis of a political economy of speed because speed has become a new source of capital and power. One way of understanding this is to look at how money is made today. Activist-scholar Walden Bello shows how speculative activity as a mode of profit making now outperforms trade. Using 2007 data, Bello compares the *daily* value of foreign exchange transactions in the international market

totalling US$1.9 trillion to the *annual* value of world trade in goods and services of US$9.1 trillion (para 6). In other words, speculative activity in the global financial markets in a single day amounts to 20 per cent of the annual value of world trade. Translated to a yearly total, speculative foreign exchange transactions amount to over US$694 trillion that is 76 times more compared to the trade in goods and services of US$9.1 trillion. Today more money is made out of money than from making things or growing food. The 1997 Asian financial crisis is a prime example of how foreign exchange speculation brought ruin overnight to many East Asian and South-east Asian economies. Since then, the feverish activity in the global financial markets has not abetted. Eleven years later, in September 2008, a global economic recession was unleashed by the collapse of many old and established banks and financial institutions; first in the United States and then Britain, the severity of which has been compared to the Great Depression of the 1930's. Taxpayers' money in the billions have been spent to bail out banks and financial institutions, while thousands of individuals have suffered personal financial calamities, and more lost jobs. This is not to attribute the cause of the crisis to technology itself but to show how ICTs have speeded up the global flow of speculative capital. Given the historical pattern of 100 financial crises in the last thirty years and a global financial system that is structurally difficult to revamp, Bello predicts more crises in the future (para 3). With instant and simultaneous transactions happening 24-hours non-stop in the global networked market, crises have become difficult to contain, which harks back to Virilio's warning of an integral and globally constituted accident.

When Virilio speaks of speed as a source of capital and power, he is referring to how speed or the symbolic possession of speed becomes a source of power. Certain groups or people have this power and have become icons of power themselves. John Armitage and Joanne Roberts describe them as the global kinetic elites who inhabit

chronotopia, a term formed from the Greek concepts for speed and utopia. They define

these elites as "hypermodernity's leading techno-social, political and entrepreneurial

groups and organisations," such as the elites of the computer industry and online e-

communities, famous computer scientists, and technical magazine writers (46).

Chronotopia refers to the 'social imaginary' of the global kinetic elites whose ideas are

popularly circulating in popular contemporary business literature broadly centred on

cyberspace, such as Bill Gates' *The Road Ahead* and *Business@The Speed of Thought*.

The titles are themselves evocative of valorising the speed of change in the connected

economy. While Armitage and Roberts do acknowledge the work of some of these global

kinetic elites in trying to address inequalities, such as the digital divide, they argue that

these efforts turn out to be futile. Quoting Manuell Castells, when the digitally

dispossessed overcome one form of inequality such as social access to the Internet,

another opens up such as access to high-speed broadband service (47). With technology

permanently innovating, Armitage and Roberts argue the digital gap never closes, making

it difficult if not impossible for the digitally (s)lower classes to catch up. Negroponte's

US$100 computer for the poor children of Africa would be viewed in the same light of

how technology offered as solutions by the global kinetic elites could end up benefiting

the giver more than the receiver.

       Kroker and Weinstein, more suspicious of the global kinetic elites, call them the

virtual class who can ride effortlessly on the digital superhighway. The virtual class, they

declare, are gung-ho about technology because they are in a position most able to exploit

its capitalist opportunities (2). The digital superhighway, "a site of global power",

becomes their ruling metaphor as well as playground because cyberspace has opened up

new wealth generating possibilities for them (Kroker and Weinstein 25). Meanwhile, the

information superhighway, "remains an invisible, placeless, floating electronic space to

the unvirtualised classes" who are the digitally (s)lower classes (ibid 25). In other words, closing the digital divide ends up benefiting the virtual class because getting everybody on the Internet actually profits those who are already ahead in the technology game.

The ambitions of iN2015 for a digitally inclusive society would, thus, serve to benefit the global kinetic elites or the virtual class in Singapore more than the digitally (s)lower classes themselves. The infocomm workforce in Singapore is one that is highly educated and young. The 2005 statistics on infocomm workforce shows 80% as tertiary educated with more than 70% below 40 years of age. Retraining the older and digitally un-initiated seems like a losing battle in an economy that is constantly restructuring to embrace the rapidly changing technological world. When technology is permanently innovating, constant de-skilling takes place in the economy, where skills become redundant faster and faster, especially for the labouring classes and those without access to modern technology. Hence, the Singapore economy will have a perennial problem with the digitally (s)lower classes. While unemployment during the current recession has stabilised since the second quarter of 2008, the number of long-term unemployed persons crept to 25,800 in June, up from 9,500 in the same month last year and 16,600 in March this year. Out of the total number of chronically unemployment, 60% comprised the older and less educated job seekers.[35] Unemployment will discipline them to accept lower paying jobs in the informal sector; their situation of exploitation being easily obscured in the knowledge-based economy. The problems of the digitally (s)lower classes are often presented as problems of individual maladjustment in a knowledge-based economy dictated by the changing global environment rather than a societal problem created by a deliberate economic ideology. Today's technology of speed has, thus, produced a politics of disappearance that totally ignore the growing inequalities inherent

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[35] Lin, Tanqin. "Worry over more staying jobless longer." *Today* 16 September 2009.

in the cyborgisation process. We need to understand this politics of disappearance in a cyborg state.

3.3   The cyborgian politics of disappearance

Virilio's catastrophic theory is based on war being "the laboratory of speed" and war becoming "the laboratory of the future" (Virilio and Dercon 72). The cyborg's collusions with the military trouble Virilio and Haraway but find ready acceptance by technologists,because many consumer and popular culture technology have their origins in military research that is US-led. The US Department of Defense has a central research and development organisation called Defense Advanced Research Projects Agency (DARPA). Its main objective is to pursue research and technology "where risk and payoff are both very high and where success may provide dramatic advances for traditional military roles and missions and dual-use applications." One example of a dual-use application and the most famous to emerge from DARPA is the ARPA-NET, the precursor of the Internet. When something as revolutionary as the Internet has resulted from military research, it is easy to dismiss Virilio's catastrophic nature of technology as techno-phobic. DARPA has a semi-divine reputation among scientists and technologists the world over, co-funding many current university and commercial R&D projects around the world. In the same light, ITR5 looks up to DARPA as a leader in advanced concepts. Iris technology, for example, is an application that was derived from military use on flying UAVs (unmanned aerial vehicles) tracking ground-moving targets. It is now commonly used for biometric identification and recognition at a distance, and works even when the person is moving. ITR5 expects that "military inventions will contribute strongly to future inventions" (Sentient Technologies 22). ITR5 cites examples of innovative R&D in defence that are relevant for the commercial world such as:

[…] smart materials in zero-power displays for air pilot headgears, virtual

reality and simulators, MEMS (micro-electronic mechanical systems),

smart dust, self-organising wireless sensor networks and mass intelligence,

chemical and biological sensors, self-regenerative portable power for

soldiers. (ibid 33)

For the next disruptive technology, ITR5 encourages thinking along the lines of the US

Department of Defense's current questioning: "how do we change the way we think about

regular operations to take full advantage of the new networked sensor technology,"

instead of the conventional "how do I use sensor networks to better do what I do today?"

(ibid 33). Both countries, the United States and Singapore, enjoy close military relations;

Singapore having now four defence training detachments based in the United States

testing and training on military aircraft purchased from the American government such as

the F-15, the Chinook helicopter, the Apache attack helicopter, and the F-16. Singapore

will continue to look towards the United States for its lead in military research to find the

next disruptive technology.

  The pace in the search for the next disruptive technology has become so relentless

that technology transfers between the military and the civilian worlds are now taking

place in both directions, instead of the military leading the way. It has become difficult to

distinguish where one ends and the other begins, and the connections are even closing in

terms of time lag. James Der Derian, following Virilio's path tracing new technologies

back to their (military) origins, maps the military-industrial-media-entertainment network

in his book, *Virtuous War*. He makes several observations on technology transfers

between the military and the entertainment world (90). One example is a war simulation

exercise, where the Marine Corps used the video game Doom and customised it for a

command and control exercise in a situation of chaos. This appropriation is significant,

Der Derian highlights, because it shows a technology transfer in the opposite direction of military applications customarily leading the way in R&D. The relationship between military simulations, the development of the computer, and the entertainment industry has been very close from the start, but the relationship is no longer led by the military. Another example Der Derian cites is the US navy's purchase of its first aircraft simulator from its designer Edward Link in 1931. A year later, while the military still had that only one, an amusement park had bought close to 50. He concludes the development lag between the real thing and its simulation has just about disappeared: weapon systems such as the F-16, the MIA2 tank, and the Aegis cruiser to the latest nuclear aircraft carrier have the video-game version arriving on the shelves almost immediately after they first appear (90). Such developments have also influenced John Armitage and Phil Graham to argue: "warfare has become industrialised while trade has itself become outright war"; both are driven by a "hypermodern managerialist emphasis" on the need for speed (2).

One major driving force for developing new technologies is in the area of security. Homeland and defence security has been identified as a long-term challenge with the rise of terrorism threats both in the real world and in cyberspace. Defending one's land has been a rallying point for nation building, especially in a new country like Singapore. Enemies, real or imagined, are often a useful strategy used historically by states to unite a people to defend what is at stake or to divert them from focusing on domestic problems. This brings to bear Der Derian's question while he was examining the United States' military budget as the world's largest spender. In the 2000 list of the top ten spenders, the US spends more than the total amount of the next nine countries' defence budgets, prompting Der Derian to ask: "Just where is this enemy who justifies such expenditure?" (111). Der Derian adds that America has been deprived of enemies of equal capabilities and will, and ponders if this defence spending comes at a disproportionately high and

perhaps dangerously high cost. After 9/11, the US military budget doubled. Der Derian asks rhetorically if this huge expenditure on the new weapon systems, such as next generation avionics (aviation and electronics), has kept America safe, make the world more peaceful, or brought more justice to international relations (111). From the Stockholm International Peace Research Institute (SIPRI), the latest 2008 figures show the US' military budget has increased to become equivalent to the total budget of the next top twenty-nine spenders.[36] Singapore, for its tiny size, is surprisingly the world's 25th top spender. For a comparison of the scale of military budgets among the top thirty spenders in the 2008 list: United States with the highest budget spent over US$548 billion, People's Republic of China, the next highest, was over US$63 billion, while Singapore in the 25th top position spent US$5.8 billion.[37]

Given that war overshadows society, Der Derian strongly believes the study of the mimetic relationship to violence in society has been grossly neglected. It does not take much imagination to link the violence in video games to its war origins. Which world mimics which now? Academic social studies have not arrived at a causal relationship between the effects of watching violence on screen and violent behaviour in its viewers. Not being able to prove the causality here does not mean there is no effect or relationship. While war is the biggest example of a human calamity of great violence, other forms of violence should be studied. Here we are reminded of Virilio's statement of the accident becoming ordinary. Der Derian gives examples of everyday violence, such as "state violence of political realism, class violence of social realism and now techno violence of hyperrealism" (33). Violence here is not physical injuries sustained or lives lost in war,

[36] The Stockholm International Peace Research Institute (SIPRI) covers 172 countries and has been collecting data since 1988 from open sources and questionnaire sent to all countries.

[37] For the comparison, the SIPRI figures are values of the national budgets at constant (2005) prices. The actual budgets in the local currencies are actually higher.

but violence committed on an everyday level of reality, unostentatious and almost imperceptible. Accidents, in this Virilian sense, could be the socio-psychological problems experienced in society, as it becomes more hooked up to Internet culture. It would, thus, be critical in a wide-reaching policy document such as the ITR5 report to see if 'accidents' are anticipated. Throughout the report, the tone about future technology is unremittingly optimistic. Some issues have been brought up but not to the extent of any grave concern. We need to comprehend if and how ITR5 views the potential accident in technology.

3.4 ITR5 and the potential accident in technology

The ITR5 report is divided into three sections called tracks. Track 1 covers Sentient Technologies, track 2 looks at Communications in the Future, and track 3 focuses on Computing Revolutions with Nano and Bio. Under track 3, no problems or issues were broached in the report. Track 2 looking at communication technologies raises the most issues among the three waves of technological change. Here, ITR5 highlights the potential health risk associated with long-term exposure to radiation from mobile phones. Studies, so far, have not been conclusive, it reports, because the problems have not been studied long enough. However, ITR5 points to a Swedish study suggesting that people who use the mobile phone for at least ten years might increase their risk of developing a rare benign tumour along a nerve on the side of the head where they hold the phone. ITR5 expresses surprise at this result and concludes that more long-term research is warranted, but makes no commitments regarding Singapore's research interest in health issues related to the increasing use of technology in our environment. On the impact of communication technologies on society and individuals, one concern was the protection of minors against growing adult content on the Internet as well as chat room predators.

ITR5 sees effective supervision here to be impossible with wireless Internet and mobile broadband, but takes consolation in the fact that these location-based services would at least provide parents with the ability to locate the children's whereabouts. ITR5 views self-regulation by mobile operators as a more effective measure and cites Vodaphone's filtering and blocking measures as an example. Another problem ITR5 brings up is spam that has grown from a minor annoyance to a significant global economic and social problem. According to ITR5, industry estimates spam formed over 60% of global email traffic today, becoming a drain on the global economy, and costing more than US$20 billion in wasted technical resources. ITR5 reports that IDA has taken a multi-pronged approach to combat spam, using a combination of public education, industry self-regulation and anti-spam legislation. Finally, ITR5 highlights the commercial exploitation of personal data and information via electronic communications on the Internet, and detailed tracking of an individual's day-to-day activities through 'location' and 'usage' information easily collected by the service provider. But it does not see governments explicitly banning such activities because it says "they want to have the power to access such information for purposes of crime prevention, anti-terrorism and other security related concerns" (ITR5 "Communications in the Future" 11).

Under track 1 on sentient technologies, the issue of personal privacy was mentioned along with the subject of Smart Dust, the billions of invisible sensors dissipated into our environment, with implications for security, human health and individual privacy. ITR5 makes two responses. The first is Singapore's unequivocal position to march on with the new technology because Singapore cannot afford to be left behind, while others speed ahead to take advantage of the new opportunities. The second response, more revealing about the trust in technology, is the attitude of ready opportunism, seizing opportunities to develop more technology. ITR5 cites research work

in Privacy Enhancing Technologies to counter information tapping and privacy intrusion. In a way, such responses could be described as being positive and making the most of an Orwellian scenario that Singapore has no control over. But I would argue that the response is more a reflection of a technocratic frame of mind that sees technology automatically as a solution to problems of technology. It is not surprising to find, as James Beniger stresses, "thus technology appears autonomously to beget technology" (qted in Hershock 591). Peter Hershock quotes Ivan Illich in his studies of transportation, educational, and medical technologies, where "beyond locally specifiable levels of development", technologies become "self-promoting, generating precisely the kind of problems they are suited to solving" (ibid 594). Hershock concurs describing how technologies have thresholds of utility beyond which they begin producing conditions of their own necessity (594). In believing that we are in control because we always have recourse to technology to solve problems, is to find ourselves in increasingly controlled circumstances (Hershock 595).

This total and unquestionable trust in technology is demonstrated when ITR5 discusses how sentient technologies can contribute to "strategic national government concerns" ("Sentient Technologies" 11). It quotes a previous IDA study on People Technologies defined as technologies that empower humans to exploit digital knowledge. A summary is offered here. The study finds an unsustainable trend whereby knowledge accumulation is exponentially increasing with the Internet but ahead of population demographic growth, thus "revealing a shortage of talents to absorb and integrate mankind's pool of knowledge" (ibid 11). Labour, on the other hand, has become highly specialised leading to further sub-specialisations of labour. ITR5 cites the example of a medical case that may require a physician, a radiologist, then a paediatric radiologist, and then a paediatric neuro-radiologist to show how these specialisations place stringent

demands on specific individuals to absorb and share an exclusive domain of knowledge. ITR5 quotes the case of operating on the Siamese twins that required a team of 20 specialists and 50 nurses, thereby implying that too many specialists were involved. ITR5 believes that while machine automation cannot replace the role of medical specialists or nurses, machines can close "the gap between global knowledge generation and a nation's ability to make use of it" (ibid 11). The conclusion quoted verbatim:

> Machine assisted environments, or smart spaces, advanced human-computer interfaces, faster and more accurate computer processing and mining of knowledge, automated sensor networks, learning machine agents and programmes, can all help to boost performance in a knowledge-driven economy. (ibid 11)

I am not totally disagreeing here but argue that looking at everything from a technocratic perspective can be worrying. ITR5 wants to leave more to machines to think and act for us because it truly believes machines are smarter and more reliable than humans. Such a technocratic frame of mind fails to see the catastrophic potential in technology, as warned by Virilio, or that growing inequalities inherent in new technologies are issues that are political in nature relating to social injustice, not technical problems requiring technological solutions. We are also reminded of Haraway's caveat of how the new machines have become disturbingly alive while humans frighteningly inert. These new machines or cyborgian tehnologies are not mere tools and appendages, but in the world of cybernetics, have become now "self-moving", "self-designing" and "autonomous" (Haraway 152).

In conclusion, there is no doubt that the cyborgian technologies in ITR5 will propel us nearer and nearer towards an immersive and pervasive virtual world as depicted in the iN2015 and Next Gen videos. Arthur Kroker describes a person living in such a

technological society as a possessed individual where "virtual reality–the world of digital dreams come alive–is what the possessed individual is possessed by" (2). Virilio, with his techno speed criticism, disapproves of the virtual world predicting it will become so powerful that it will take over actual reality. Being possessed by virtual reality is to live in Albert Borgmann's hyperreal conditions of hypermodernism, where the tendency in our allegiance to technology is "to give technology a hyperfine and hypercomplex design" (82). Hyperreality reaches a final stage, according to Borgmann, when the artificial becomes a new reality that surpasses traditional reality in the three qualities of brilliance, richness and pliability (83). Visiting the zoo can be described as a hyperreal experience of the wild, but projecting a video in the clean and comfortable living room, seen in the iN2015 video, takes it further to its final stage of hyperreality. In this hyperreal stage, images are enhanced to make it more brilliant, more rich than the real encounter, and the experience totally pliable in that it can be ended at one's will in one's safe and comfortable living room, compared to encountering nature in all its continuous and commanding presence (Borgmann 96). This is exactly Virilio's concern with virtual reality, a precondition for living in hyperreality. The state cyborg of iN2015 inhabits this hypermodern techno life that can be described as living perpetually in technicity, one that is addicted to innovation, speed, and the hyperreal. Such a life results from a technocratic vision that is always seeking the perfect technical system, believing that all problems have a technological solution lying ahead in the future, thus overlooking current socio-political dimensions of the cyborgisation process that are aggravating existing socio-economic inequalities.

Conclusion

Singapore's cyborg destiny

The thesis declares at its start that Singapore makes an excellent study of the cyborg phenomenon, quoting Alwyn Lim that to write a history of Singapore's development is also to write a history of technology in Singapore. National ICT plans have shaped Singapore's technological environment in the last three decades of its 44-year history, with the most ambitious plan to date consisting in the Intelligent Nation 2015 master plan. The thesis is interested in the concerns and issues underpinning the cyborgisation of Singapore from this sweeping and wide-reaching ICT policy document accepted as the definitive authority of all things technological in Singapore. The investigation reveals that iN2015 engenders a cyborgisation process driven mainly by the technologically possible and desirable with consequences that are contradictory to its aspirations of a digital future that is empowering for all. It also discovers that the iN2015 produces cyborgs as one-dimensional, ontologically and politically, with its message of empowerment driven mainly by consumption, while living a life in technicity; a hypermodern techno lifestyle, addicted to speed, innovation, and the hyperreal. In the investigation of iN2015, Haraway's cyborg has been lobbied precisely to find other ontological and political possibilities of responding to and living in the ICT world. How has Haraway's cyborg metaphor helped in going beyond the limitations of the iN2015 cyborg? And how have contributions from Virilio and Youngs helped in the interrogation of the ontology and politics of new technology promoted under iN2015? The thesis will conclude reviewing these questions. It will also briefly survey the progress of iN2015 three years after it was launched, and finally close with a note on the limitations of the

thesis offering possible areas for future investigation that have surfaced during the course of the current research.

1   *Haraway, Virilio and Youngs and the iN2015 landscape*

The cyborg has been used as the main lens in the thesis through which to investigate the iN2015 vision and mission. The cyborg originally refers to a technologically enhanced human whether biochemical, mechanical or electronic, but its usage begins losing its innocent connotation with the advent of ICTs and all the new technologies that have since been spawned. Thus, the cyborg has become associated more specifically with new technologies centred around ICTs. The cyborgisation of modern society, as the thesis has stated several times, is inevitable today and its influence unavoidable particularly in the Singapore metropolis. While we might not be cyborgs, we most certainly live in a cyborg society. Without a doubt, iN2015 is speeding up the cyborgisation of Singapore affecting almost every aspect of the nation's life, obliging its citizens to become cyborgs to live in the brave new technological world of tomorrow. Neither iN2015, nor its infocomm technology roadmap, ITR5, uses the cyborg term. The thesis finds this omission, or the lack of reference to the cyborg discourse, problematic, because such an omission reflects a certain frame of mind directing and shaping the future for Singapore. [38] This frame of mind has been described in the thesis as technocratic: one that holds supreme confidence in a technotopia, which is a utopia that is mainly delivered by things technological. The technocratic mindset believes that all problems are of a technical nature that can be solved with technology while often ignoring socio-political and even technological dimensions of current problems. Thus, adopting the term, cyborg,

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[38] There was one reference made to an article that was summarily dismissed. See page 11.

has been necessary to suggest there are concerns and issues arising from the increasing cyborgisation of Singapore under iN2015, particularly as its vision promises technotopia.

Haraway's cyborg metaphor has been used to show that these concerns and issues have ontological and socio-political dimensions. But when it comes to a policy document, how effective is Haraway's cyborg in its investigation of the iN2015 master plan? Admittedly, it has been challenging to apply the theory drawn from an American perspective of a feminist scientist to a Singapore situation with its survival mentality entrenched in the minds of policy makers as well as in its people. Eventually, two areas stand out where Haraway's cyborg has been found extremely relevant, which have been further reinforced by contributions from writers Virilio and Youngs for both their analogous views and divergent approaches. The first area deals with the question of techno pessimism, and the second area concerns the particular ontology and politics of Haraway's cyborg. I will now discuss both.

A nagging concern that has dogged this analysis of Singapore's cyborgian destiny through the iN2015 vision is how to prevent its reading as anti-technology. Lobbying Haraway's cyborg as a platform for examining the productive tensions in the machine-organism symbiosis was one way to dispel the anti-technology charge. The paradoxical relationship with new technology, represented by Haraway's cyborg, shows just how unproductive and overly simplistic it is to draw the line on technology between the two opposing positions of total denial or blanket affirmation. The thesis, instead, endorses the ontological status of the cyborg, which is its machine-organism hybridity, accepting Haraway's position that returning to their separate status is not possible or even desirable any more. To ask the question, can we do without technology, is pointless, as remarked by Virilio. Instead, the question of technology should be expanded not only to the substance produced, referring to their instrumental purposes but also to its potential

accident. Applying Virilio's epistemo-technical questioning, the 'accident' or accidents in technology are what the thesis has been interested in uncovering in *intelligent nation Singapore under iN2015*. In other words, the technological is accepted as constitutive of the human society. What is in question is the attitude towards technology and the kind of technologies promoted too readily without epistemo-technical questioning. For Haraway, the accident or accidents of technology are the growing disparities along the power hierarchies of class, race, and gender, ferociously still in place in the informatics of domination. For Virilio, the accident or accidents are virtual reality taking over actual reality with all its implications, including that of the information bomb unleashing an integral and globally constituted accident. Generally, Virilio is viewed as being anti-technology, while Haraway holds a more hopeful position. Toggling between these two positions of Haraway's and Virilio's has actually helped to surface the assumptions and contradictions in the attitude towards technology. Virilio is highly critical of technology viewing its origins in military weaponry as their essential nature that can never be relinquished. If we look at how war has featured in the whole of human history, how the arms race has dominated international relations, and how important the arms industry has become for many national economies, Virilio's critique must be taken on board when investigating new technology. Haraway also acknowledges the cyborg's origins in militarism and patriarchal capitalism (she includes state socialism here), and describes these as the cyborg's main trouble. But Haraway departs from Virilio in her more hopeful position on the potential possibilities of new technology, seeing cyborgs as signalling both "disturbingly and pleasurably tight coupling" (152). Is this too much of a compromising position? Haraway uses her position-that of a feminist scientist-to show that one need not be duped while negotiating through the world of science and technology. If Virilio's epistemo-technical approach is to be adopted, this requires

knowledge of the tools that have marked the world "that marked them as other" (ibid 175). What is crucial in both Haraway's and Virilio's positions is to be reminded of the cyborg's origins. As Haraway has stressed, the new machines are disturbingly alive while humans are frightening inert. Hence, it becomes critical to be mindful of the ontology and politics of new technology and for this, Haraway's cyborg takes centre-stage again.

       This thesis began by discussing many cyborgs but two were specially mentioned. Clynes and Kline's originally named cyborg refers to an enhanced human exogeneously extended to adapt and survive in extreme environments. Haraway's cyborg is the ubiquitous human-machine hybrid in our posthuman times, but one committed to a feminist, socialist and materialist politics. What counts as extreme environment differs for the two cyborgs. Clynes and Kline's extreme environment refers to a physical environment–outer space for man's next conquest. Haraway's environment is the posthuman condition where peoples and worlds have become reconstructed as pure information and data. For Haraway, this 'extreme environment' has been largely created by the cyborgian technologies producing the informatics of domination ferociously reinforcing the hierarchies of class, race, and gender. Haraway's informatics of domination, the scary new networks, is pernicious on two counts. The first is, as informatics, the networks reduce organisms to pure information and data, becoming merely 'a problem in coding', thus reducing differences as genetic or information codes, and masking the objectification of bodies as commodities. The second is, precisely as informatics, the networks make it easy to be integrated into "the world system of production/reproduction and communication" (Haraway 163), appearing as empowerment when it can simultaneously be an exploitation of labour and personal data. While Haraway was referring to women working in the integrated circuit, this could also include social networking websites, such as Facebook increasing its proprietory value as more

users and personal data are captured. In contrast to these two worlds of Clynes and

Kline's and Haraway's, we have the normative middle class environment of the iN2015

cyborg saturated with Next Gen devices and the smart sentient technologies of the future

as shown in the IDA videos. The iN2015 cyborg is idealised as a consummate consumer

of new technologies, living a life totally in technicity, while the dynamics of social

reality, such as one's identity and social relations, remain totally unchanged. The iN2015

landscape testifies Virilio's caution on the aesthetics of disappearance, and how the

technology of speed has seductively bought easy acquiescence for all its consumer

outcomes. iN2015 is a landscape of pure technotopia, and as a utopia, it has been

removed totally from reality. But the iN2015 technotopia is sold not to the digitally

s(lower) classes or the hungry masses. It is sold to those who are already privileged, with

their feet and bodies firmly in the technological world. A good reminder comes from

Youngs' argument of inequality as a driving force for growth and development. In an

existing unequal world, ICTs have been sold as an economic leveller. Like any tool, they

offer opportunities, but because it is an unequal world, ICTs can further embed the

inequities, particularly those related to socio-economic and gender differences. In that

regard, Haraway's hopeful position on technology may seem overly optimistic. Thus, the

cyborg, as a strategic intervention in an emerging world order totally mediated by new

technology, has to be grounded consciously in a politics that is committed to

"fundamental changes in the nature of class, race, and gender" (Haraway 161). And this is

where Haraway's cyborg differs fundamentally from the cyborgs of iN2015. As the

cyborg is our ontology, the cyborg must also discern and deliver the right politics.

3.   *Progress report on iN2015*

In examining the impact of technology, it has been useful to note how technology can be approached–as an exogenous or endogenous factor–as brought up by Youngs. As an exogenous factor, technology is viewed as instrumental, that is, as ends and means, or a tool and object of policy. As an endogenous factor, the social context becomes important, that technology shapes social forces as much as it is shaped by social forces. In looking at the iN2015 policy document through Haraway's cyborg, the thesis so far has adopted the endogenous approach with questions of power and inequality as the dominant themes being examined. To look at the achievements of iN2015 in terms of its goals and objectives, we now review technology as an exogenous factor, that is, as a tool and object of policy. What does the progress report of iN2015 look like three years after it has been launched?

When it comes to generating revenue and jobs, the infocomm industry has seen steady growth in the couple of years since iN2015 was launched. In economic value, Singapore's infocomm industry revenue has grown over 10% since 2006, outperforming the rest of the economy. It achieved S$45.42 billion in 2006 and reached S$58.1 billion by 2008, with export revenues accounting for 61% of total industry revenue. In terms of employment, infocomm manpower grew from 119,700 in 2006 to 139,000 in 2008. Infocomm usage during these three years has also seen rapid growth, especially with mobile phone and broadband subscription. Generous subsidies have been extended to needy households to own computers. All these gains could not have been possible if not for the massive government funds invested in infrastructure, R&D grants, and business tie-ups with global corporations and research institutes. To cite some examples, the new fibre-optic broadband infrastructure costs $1 billion; Mediapolis, the digital media hub with state-of-the-art studio facilities, costs $1 billion to build in Singapore's one-north, which is a $15 billion 200 hectare, self-contained research hub in Buona Vista promoting

a 'work, live, learn and play' lifestyle aimed mainly at attracting foreign experts; and the new Standard Operating Environment (SOEasy) project to streamline the whole civil service using one integrated system costs $1.3 billion. Many more hundreds of millions of state funds are also helping infocomm businesses in schemes, such as the recently launched Singapore Media Fusion Plan under the Media Development Authority (MDA) receiving $230 million funding on top of $500 previously committed to develop interactive digital media.

The iN2015 strategy to build an infocomm-savvy workforce and globally competitive infocomm manpower are being tackled early through the formal educational route. Teachers, pupils and students are well connected in highly computerised school environments that are well on its way to achieving targets such as the pupil-computer ratio of 6.5:1 in primary schools and 4:1 in secondary schools and junior colleges. The FutureSchools@Singapore project with its extensive use of ICTs for teacing and learning, is being pioneered in five selected schools. Outside of schools, IDA has awarded training grants, subsidised training schemes, funded IT tertiary scholarships and internships locally and abroad, offered venture capital funds and mentorship programmes for start-ups, invested heavily in tie-ups with global industry players and research institutions, while doling out huge amounts of state funds for R&D. Constant re-skilling, upgrading, and retraining have become the mantra of human resource management in Singapore's globalised economy, where productivity has been on the decline and technology identified as the panacea.[39] In these three years, IDA has certainly forged ahead to make infocomm the key resource to build on human capital by "retooling Singaporeans and businesses" to compete in the global marketplace (iN2015 34).

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[39] Chin Lian Goh, "Preparing 10 Workers to Do the Job of 12." *Straits Times* 1 Aug 2009.

It would, thus, be churlish not to commend IDA for its achievements towards meeting its six goals (page 8) since iN2015 was launched in 2006. Jobs and revenue have been generated, more and more Singaporeans own computers and are connected, and high speed broadband has arrived. In that respect, if iN2015 is viewed as an economic blueprint, this all-embracing ICT policy document can be commended for being ambitious, comprehensive, and forward-looking. However, the iN2015 report sets out to be more than an economic number cruncher. It has painted dreams and sold promises to all Singaporeans of a bright, prosperous, exciting future that is only possible if, and only if, infocomm is fully embraced, both personally and nationally. Evidently, iN2015 has adopted an unquestioning and uncritical view of technology, held with missionary fervour, which can only be described as a seduction to the ideology of technology as progress. The iN2015 vision, when probed deeper, is found to be led totally by its technology roadmap, the ITR5, which is driven more by what is technologically possible and desirable, rather than addressing ontological and political dimensions of living today with modern ICTs that go beyond consuming technology to enhance comfort levels.

The cyborg future in 2015, as we have seen, necessitates a form of technological citizenship that obliges citizens to be technologically knowledgeable, but to the extent of being mainly media savvy users and consumers of new technology. The thesis has drawn on the cyborg metaphor to reveal the tensions that arise when the technological is favoured over the organic or what is essentially human, thus affecting bodies, identities and social reality. Beneath the gloss of dazzling animations, official ICT plans with fancy acronyms, and 'hip' corporate videos such as MDA's Upper Management Rap, more analyses are required to get behind the glowing statistics and the hype promoted of new technology. While infocomm has created jobs and contributed to national income, the evidence also points to infocomm deepening the growing socio-economic disparities.

Singapore's worsening Gini index, dismissed by the highly revered Minister Mentor as irrelevant to Singapore's economic development[40], also becomes ignored by policy makers as a guide to correct government policies, or as a barometer of social cohesion and even of social justice. For those digitally left behind, their citizenship status becomes defined by their seclusion from technology that turns into an economic exclusion with its high personal costs and social stigma. Aihwa Ong's reconceptualization of citizenship in the ecology of expertise needed for the high tech sectors becomes acutely relevant as Singapore implements the iN2105 vision to achieve its macro goals. While examining Singapore's bio-tech sector, Ong finds that the knowledgeable, risk-taking and entrepreneurial subjects have been found mainly among foreign professionals (339).

Infocomm has been shown to aggravate existing inequalities and to produce new strains of inequalities, both globally and locally, but iN2015 takes an opposite position and sees it as a powerful leveller in society. Such a position flies in the face of mounting evidence confirming Haraway's informatics of domination. It behooves all to see who the marketeers of technotopia are in *intelligent nation* Singapore. Are they the global kinetic elites, the virtual class, and/or the technologically knowledgeable citizens? We return for the last time to Haraway's cyborg for the question about techno politics.

Haraway's cyborg and techno-politics

Almost everyone who has a message to sell an audience today uses new media and its social networking tools to create the viral effect in marketing. Governments, church groups, NGOs and activists are twittering, blogging, using Facebook, targeting

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[40] At a recent university forum in October 2009, Minister Mentor Lee Kuan Yew was asked what Singapore could do to narrow its income gap. MM Lee, as he is referred to, replied: "Never mind your Gini coefficient. If you don't have a job, you get zero against those with jobs. So our first priority is jobs for everybody." Reported in Jeremy Au Yong, "MM Lee: Social Divide Inevitable," *Straits Times* 20 October 2009.

especially the young who are expectedly more savvy with these media tools. In Singapore, several ministers, for example, Ministers George Yeo and Khaw Boon Wan, have also taken to blogging to connect with voters. But in April this year, new media communication tools were used to great effect for serious political jockeying in a leadership tussle over Singapore's feminist advocacy group, AWARE. The occasion, called the AWARE saga, caught everyone off-guard when women in the thousands, a scenario never before experienced in the organisation's 24-year history, turned up voluntarily to vote in a referendum. The incident became a cause célèbre, in Singapore's turgid political scene, dominating local media–traditional and new–every day for weeks. The power struggle over AWARE signalled the dangers of mixing politics with religion in Singapore. But this incident is quoted here to show the use of new media tools by opposing groups in a political tussle for democratic control of an activist NGO. The AWARE saga is a good example of the dilemmas of Haraway's cyborg deployed as a strategy for political intervention, and I like to make two observations in relation to the question of techno-politics. The first regards the users of the media tools, and the second concerns the message of the democratic potential of these tools.

If cyborg techno-politics is about "seizing the tools to mark the world that marked them as other" recalling Haraway's adoption of Sandoval's oppositional consciousness (175), who can be a cyborg and who can she/it speak to? Clearly, it is the educated, the tech-savvy and most likely middle-class in Singapore, a profile that describes AWARE's members. The use of cyborgian tools reach out and appeal mainly to cyborgs themselves, and not generally the digitally (s)lower classes marked by these tools. Web activism is, thus, limited to those who have access to and are comfortable users of these tools. New media tools, as compared to traditional media like newspapers and television, have been celebrated for its democratising potential in allowing a wider circulation of opinions from

the ground and opening up new political spaces for civic engagement. While new media tools certainly allow for a wider dissemination as well as debate of ideas, the message of their democratising potential needs to be weighed up against the reality of effecting substantial change on the ground. The Aware saga brought change within the organisation re-instating its former feminist principles, but outside its own turf, the incident has not changed much of the political status quo that it had hoped to address. While the empowerment from using new media tools was indeed euphoric for AWARE supporters, the democratic rhetoric in using these tools can slide easily into the uncritical message of progress behind new technology. While using these tools empowers the user, their political effectiveness as a democratic leveller solving actual problems on the ground must also be questioned. It is, thus, worth being reminded that imbibing the empowerment message of new technology uncritically in doing politics is no different from becoming the iN2015 state cyborg, a rabid consumer of all things technological but nothing else ontologically and politically.

It is important to note that Haraway has moved from the cyborg to her companion species, adding living species, such as 'man's best friend', our domestic animals, as kinship for exploring the basis of cooperation and building un-exploitative social relations. This shows that while the cyborg has been a very useful tool for analysis, to claim its identity exclusively in formulating a responsible techno-politics may be a first step, but insufficient on its own to provide the right kind of politics in cyborgian times. While Virilio rejects new technology because he fiercely believes these tools have erased the political, he is fully engaged in ground politics among the homeless poor in Paris, acknowledging their superior dignity in the way they survive. But, ultimately, we would still need Haraway's cyborg for its anti-dualism and techno-politics, Vilirio's epistemo-technical questioning and techno-speed criticism, and Youngs' political economy analysis

of inequality, to understand today's hypermodern techno world seduced by speed, constant innovation, and the hyperreal. Without the vigilance afforded and tempered by these critical tools, *intelligent nation* Singapore would be cold and soulless, a place for the technologically knowledgeable and powerful manipulating the other classes for their own privilege.

4.   *Limitations of study and future research*

A major limitation of the current research is the wide scope of the subject matter presented by the iN2015 report and its accompanying Infocomm Technology Roadmap report. Both were extensive documents, each running over 150 pages, in addition to related materials such as the IDA corporate videos and website. In dissecting the macro perspective of the iN2015 vision, it was difficult to focus at the same time on the domestication of ICTs and the implementation of infocomm policies directed by iN2015 in certain industries or sectors. Among the ten sectors spotlighted by the iN2015 for infocomm development, I would highlight education and learning, and healthcare and biomedical sciences, as essential areas to examine for a further understanding of how the cyborg state is perceived, conceived and constructed in the social imaginary of the policy drafters and administrators. Another limitation of the thesis is the lack of interviews with the policy drafters themselves and the many sub-committee members behind the fuller iN2015 document. With a policy document that will have such far-reaching impact for Singapore's future, it is crucial to study the process in which the iN2015 document was produced. IDA has always presented the iN2015 as a public, private, and people sector co-creation. Examining what this means against actual reality would reveal Singapore's policy making and governance processes. Future research is suggested in areas that have been glossed over by the iN2015 report. One is the grossly overlooked gender perspective

in ICT planning and its impact on education and the economy. Another is Singapore's military-industrial-scientific-entertainment-media complex, how key players are interlinked, with all its consequent socio-political-economic implications. Finally, as Singapore gets more wired up and connected under the iN2015 plan, increasing control and surveillance will further impinge on personal privacy issues, bearing consequences for the democratizing process of a polity still in its nation building stage.

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TABLE 40

EMPLOYED RESIDENTS AGED FIFTEEN YEARS AND OVER BY OCCUPATION, INDUSTRY AND SEX, JUNE 2007

(TOTAL)

In Thousands

Occupation (SSOC 2005) / Industry (SSIC 2005)	Total	Managers & Senior Officials	Working Proprietors	Professionals	Technicians & Associate Professionals	Clerical Workers	Service & Sales Workers	Production Craftsmen & Related Workers	Plant & Machine Operators & Assemblers	Cleaners, Labourers & Related Workers	Others*
(Total)	1,842.1	190.1	79.8	280.4	350.3	251.9	212.9	96.0	169.5	147.3	63.7
Manufacturing	313.4	42.0	7.6	55.7	64.2	34.4	3.4	36.7	58.7	10.8	-
Construction	103.4	11.2	11.9	11.0	12.1	9.3	0.3	32.1	7.1	8.4	-
V Services	1,404.2	134.5	59.9	211.2	267.8	206.0	208.8	25.8	101.8	125.6	62.8
G Wholesale & Retail Trade	282.3	37.6	32.2	14.0	37.0	47.5	81.6	4.5	15.9	11.8	0.1
H Transport & Storage	182.4	13.2	4.8	6.2	25.1	30.3	13.2	3.1	73.0	13.7	-
J Hotels & Restaurants	125.4	6.2	3.9	0.7	4.1	9.9	49.4	1.6	2.6	47.1	-
K Information & Communications	90.6	17.0	2.0	41.6	15.9	10.4	1.2	1.4	0.6	0.6	-
L Financial & Insurance Services	112.4	19.2	0.7	20.5	37.7	24.9	0.5	0.1	0.4	0.5	-
M Real Estate, Rental & Leasing Services	41.6	5.4	1.1	2.6	19.2	6.5	0.8	1.7	0.7	3.7	-
N Professional, Scientific & Technical Services	100.1	15.5	4.0	33.5	25.5	17.2	0.9	1.3	1.2	1.1	-
O Administrative & Support Services	86.9	5.3	3.3	2.7	8.1	13.1	24.3	1.0	2.4	26.9	-
P, T Public Administration & Education Services	223.6	6.8	1.4	62.1	50.0	19.2	13.2	0.7	2.4	5.4	62.4
Q Health & Social Services	71.6	3.3	0.4	12.9	31.7	14.8	3.6	0.2	0.4	4.2	-
R, S, U, V Other Community, Social & Personal Services	87.2	5.1	6.0	6.5	13.7	12.1	20.3	10.2	2.3	10.7	0.2
B, D, W Others#	21.0	2.4	0.5	2.4	6.3	2.2	0.4	1.5	1.8	2.5	0.9

* Includes Agricultural & Fishery Workers and Workers Not Classifiable by Occupation.

Includes Agriculture, Fishing, Mining & Quarrying, Utilities and Activities Not Adequately Defined.

TABLE 40 (continued)

EMPLOYED RESIDENTS AGED FIFTEEN YEARS AND OVER BY OCCUPATION, INDUSTRY AND SEX, JUNE 2007

(FEMALES)

In Thousands

Industry (SSIC 2005) / Occupation (SSOC 2005)	Total	Managers & Senior Officials	Working Proprietors	Professionals	Technicians & Associate Professionals	Clerical Workers	Service & Sales Workers	Production Craftsmen & Related Workers	Plant & Machine Operators & Assemblers	Cleaners, Labourers & Related Workers	Others*
Total	782.5	66.2	16.2	114.9	170.1	195.5	97.0	9.8	35.7	75.5	1.5
C Manufacturing	118.5	10.3	1.0	14.3	21.9	25.9	1.6	7.3	30.9	5.2	-
F Construction	19.2	2.0	1.0	2.6	3.6	8.0	0.1	0.5	0.2	1.3	-
G - V Services	640.7	53.4	14.1	97.5	143.6	160.3	95.3	2.1	4.6	68.4	1.3
G Wholesale & Retail Trade	132.9	12.3	7.1	6.1	18.5	36.8	44.0	0.8	1.3	5.9	-
H Transport & Storage	41.3	4.1	0.6	2.2	7.5	17.4	5.5	-	1.4	2.6	-
J Hotels & Restaurants	64.8	2.4	1.1	0.3	2.2	7.5	20.9	0.5	0.1	29.7	-
K Information & Communications	36.6	6.3	0.3	12.3	7.5	8.8	0.6	0.2	0.2	0.5	-
L Financial & Insurance Services	64.5	9.8	-	12.9	20.7	20.7	-	-	-	0.4	-
M Real Estate, Rental & Leasing Services	19.1	2.1	0.2	1.1	8.2	5.4	0.3	-	-	1.8	-
N Professional, Scientific & Technical Services	48.9	6.2	1.1	14.1	11.5	14.2	0.5	-	0.4	0.9	-
O Administrative & Support Services	37.8	2.1	0.7	1.4	4.6	10.5	3.7	0.2	0.7	14.0	-
P, T Public Administration & Education Services	96.8	3.4	0.7	38.6	30.8	15.5	2.7	0.1	0.2	3.6	1.3
Q Health & Social Services	54.1	2.4	0.2	5.7	26.3	13.5	3.0	-	0.1	2.9	-
R, S, U, V Other Community, Social & Personal Services	44.0	2.3	2.1	2.9	5.6	10.1	14.2	0.2	0.3	6.3	-
A, B, D, Others# E, W	4.1	0.5	-	0.5	0.9	1.4	-	-	0.1	0.5	0.1

* Includes Agricultural & Fishery Workers and Workers Not Classifiable by Occupation.

Includes Agriculture, Fishing, Mining & Quarrying, Utilities and Activities Not Adequately Defined.

TABLE 40 (continued)

EMPLOYED RESIDENTS AGED FIFTEEN YEARS AND OVER BY OCCUPATION, INDUSTRY AND SEX, JUNE 2007

(MALES)

In Thousands

Occupation (SSOC 2005) / Industry (SSIC 2005)	Total	Managers & Senior Officials	Working Proprietors	Pro-fessionals	Technicians & Associate Pro-fessionals	Clerical Workers	Service & Sales Workers	Production Craftsmen & Related Workers	Plant & Machine Operators & Assemblers	Cleaners, Labourers & Related Workers	Others*
Total	1,059.5	123.9	63.6	165.5	180.2	56.3	115.9	86.2	133.8	71.8	62.2
C Manufacturing	195.0	31.7	6.5	41.4	42.3	8.6	1.8	29.4	27.8	5.6	-
F Construction	84.2	9.2	10.9	8.4	8.4	1.4	0.2	31.6	7.0	7.1	-
G - V Services	763.4	81.1	45.7	113.7	124.2	45.6	113.6	23.7	97.3	57.2	61.4
G Wholesale & Retail Trade	149.4	25.3	25.2	7.9	18.4	10.7	37.6	3.7	14.6	5.9	0.1
H Transport & Storage	141.2	9.1	4.3	4.0	17.6	12.9	7.6	3.0	71.6	11.1	-
J Hotels & Restaurants	60.6	3.8	2.8	0.4	1.8	2.3	28.5	1.1	2.5	17.4	-
K Information & Communications	54.0	10.7	1.7	29.2	8.4	1.7	0.6	1.3	0.4	0.1	-
L Financial & Insurance Services	47.9	9.3	0.6	15.6	17.0	4.2	0.5	0.1	0.4	0.2	-
M Real Estate, Rental & Leasing Services	22.5	3.2	1.0	1.5	10.9	1.1	0.5	1.7	0.7	1.9	-
N Professional, Scientific & Technical Services	51.2	9.3	2.9	10.4	13.0	3.0	0.4	1.3	0.8	0.2	-
O Administrative & Support Services	49.2	3.2	2.6	1.3	3.4	2.6	20.6	0.8	1.7	12.9	-
P, T Public Administration & Education Services	126.8	3.4	0.7	23.6	19.2	3.8	10.5	0.6	2.2	1.8	61.1
Q Health & Social Services	17.5	0.9	0.2	7.2	5.4	1.4	0.6	0.2	0.4	1.3	-
R, S, U, V Other Community, Social & Personal Services	43.2	2.9	3.8	3.6	8.1	2.0	6.1	10.0	2.0	4.4	0.2
A, B, D, Others# E, W	17.0	2.0	0.5	2.0	5.4	0.8	0.4	1.5	1.7	2.0	0.8

* Includes Agricultural & Fishery Workers and Workers Not Classifiable by Occupation.

Includes Agriculture, Fishing, Mining & Quarrying, Utilities and Activities Not Adequately Defined.