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Exhibiting the Future: New Technology on Public Display

Up & Coming in the Magic Kingdom

On 1st June 2005, Honda proudly announced that its Asimo robot would soon be taking pride of place inside the Tomorrowland exhibit at the Disneyland amusement park in California. Nearly two metres tall, this shiny white machine was designed to look and behave like a human being. With its arms, Asimo could pick up objects and flick switches. Using its legs, the robot was able to walk across most types of terrain and even climb stairs. Equipped with visual sensors, Asimo could avoid obstacles and recognise human faces. Best of all, this mechanical marvel understood voice commands and then acted upon them. Not surprisingly, Honda was delighted to have the opportunity to show off its new android to the huge crowds at Disneyland. During the two years before the announcement, its engineers had demonstrated the amazing abilities of the Asimo robot to an estimated 130,000 people at science museums and technology shows across the USA and Canada. In these presentations and on its website, Honda emphasised that the best was yet to come; the current model of Asimo was the precursor of intelligent machines which would be able to perform complex tasks like caring for the elderly or fighting fires. When the Disney contract was made public, Honda promised that its prominent position in the Tomorrowland exhibit would be used to celebrate this prophetic vision: "The 15 minute demonstration [will be] … a glimpse into a not-too-distant future where humanoid robots … will assist humans in their homes." (Honda 2005).

At the beginning of the 21st century, the dream of technological utopia is deeply embedded within the popular imagination. For its display at Disneyland, Honda could draw upon one of the most potent myths of the modern world: the thinking machine. From childhood onwards, people in "the developed world" have grown up with images of robot buddies like Data in *Star Trek TNG* and of pitiless monsters like the cyborg in *The Terminator* (Startrek.com 2005; Cameron 1984). These science fiction fantasies have been encouraged by confident predictions from prominent computer scientists. Just down the road from Disneyland, Ray Kurzweil and Vernor Vinge have been eagerly waiting since the 1980s for "the Singularity": the First Coming of the Silicon Messiah. Continual improvements in hardware and software must eventually culminate in the creation of artificial intelligences more powerful than the "biological intelligence" of the human mind. (Vinge 1993; Bell 2004).

The success of the Asimo display in Tomorrowland will depend upon this widespread belief in the prophecy of the thinking machine. Honda was convinced that visitors to Disneyland will admire its robot not for what it can do in the here and now, but for what more advanced models *might* be able to do one day. The present is understood as the future in embryo – and the future illuminates the potential of the present. Every step forward in computing technology is further progress towards the final goal of artificial intelligence. The prediction of a fully conscious machine comes closer to fulfilment with the launch of each new piece of software or hardware. Contemporary reality is the beta version of a science fiction dream: *the imaginary future.*

Despite its cultural prominence, the meme of sentient machines is vulnerable to theoretical exorcism. Far from being a free-floating signifier, this prophecy is deeply rooted in time and space. Not surprisingly, today's boosters of artificial intelligence rarely acknowledge the antiquity of the concept itself. They want to move forwards, without looking backwards. Yet, it's over half a

century since the popular imagination in America was first gripped by the public display of a friendly thinking machine by a large corporation. The promotion of the imaginary future of artificial intelligence has a long history. Examining earlier attempts to propagate this prophecy is not only essential for understanding its latest iteration in the Asimo exhibit at Disneyland. Above all, this "archaeology of the future" also provides an insight into why the public display of new technologies has played such a significant role in shaping our comprehension of the modern world. Far from being a diversion, looking backwards is the precondition for moving forwards.

Building the World of Tomorrow

In its publicity, Honda explained that 'Asimo' is the acronym of "Advanced Step in Innovative Mobility". However, it is no coincidence that the name of its machine also closely resembled that of Isaac Asimov – the celebrated science fiction writer. Until the mid-twentieth century, almost every story about artificial beings had imitated the plot of Mary Shelley's *Frankenstein*. Sooner or later, the creature turned into a psychotic monster which tried to kill its human creator. In 1940, Asimov set out to change this negative image of the robot. Reversing the popular stereotype, his tales described devoted mechanical servants with loyalty to their human masters hardwired into their "positronic brains" (Asimov 1968, 1968a). This new approach had been inspired by Asimov's visits to the 1939 New York World's Fair. In the Westinghouse pavilion, the star exhibit was Electro: "an 8-foot metal man that talks, sees, smells, sings, and counts with his fingers" (New York World's Fair 1939, p. 195). Although it was only a gimmick, this machine was the stage debut of the imaginary future of artificial intelligence in the USA. Electro was Asimo version 1.0. At the 1939 World's Fair, the robot was – for the first time – put on display as the friend of humanity. In his stories, Asimov took this optimistic vision and popularised it among the wider American public. Just like Electro, his fictional robots were safe and reliable products of a large corporation. Before the 1940s were over, computer engineers in the USA had begun work on turning Asimov's fantasy of positronic brains into really-existing thinking machines. In both science fiction and science fact, the robot had become the promise of better times to come.

In its advertising slogan, the 1939 World's Fair proclaimed its modernist mission: "Building The World Of Tomorrow". At the time, Asimov was one of the few people who believed that the embodiment of this aspiration could be found in the Westinghouse pavilion. In the late-1930s, the motor car – not the robot – was the technological icon of the epoch. At the World's Fair, the two most popular attractions were New York State's Democracity and General Motors' Futurama pavilions. Visitors flocked to admire their massive dioramas showing what America would look like in the 1960s: vast cities of mega skyscrapers and elevated walkways linked by multi-lane motorways to garden suburbs, public parks and industrial districts. In these exhibits, big government and big business promoted the same vision of the imaginary future: the consumer society. Within two decades, the majority of Americans would be living in family homes and commuting to work in motor cars (New York World's Fair 1939). Combined together, the political wisdom of the US government and the productive potential of American industry would create "the good life" for everyone.

For most of the visitors to the 1939 New York World's Fair, this imaginary future of automotive prosperity must have seemed like a utopian delusion. The American economy was still recovering from the worst recession in the nation's history and Europe was on the brink of another devastating civil war. Yet, within twenty five years, the predictions of the Democracity and Futurama dioramas had been largely realised. However sceptical visitors to the World's Fair might have been back in 1939, America of the early-1960s was a suburban-dwelling, car-owning consumer society. The imaginary future had become everyday reality.

"The motor car … directs [social] behaviour from economics to speech. Traffic circulation is one of the main functions of a society … Space [in urban areas] is conceived in terms of motoring needs and traffic problems take precedence over accommodation … it is a fact that for many people the car is perhaps the most substantial part of their 'living conditions'."
(Lefebvre 1984, p. 100)

In the early-1960s, Americans had good reasons for feeling optimistic about their prospects. During the previous fifty years, their nation had out-produced, out-fought and out-smarted all of its imperial rivals. The USA had become a political and military superpower without comparison. The American population enjoyed the highest living standards on the planet (Ambrose 1971; Wallerstein 1984). To celebrate these achievements, the US elite decided to organise another – and even better – global exposition in New York. On 22nd April, the 1964 World's Fair opened to the general public on the same site as its 1939 predecessor. Every section of the American ruling class was represented at the exposition: the federal government, US state administrations, large corporations, financial institutions, industrial lobbies and religious groups (Editors of Time-Life Books 1964; Stanton 2004). The 1964 World's Fair demonstrated to the whole world that the USA was the leader in everything: consumer goods, democratic politics, show business, modernist architecture, fine art, religious tolerance and domestic living, The long and arduous evolution of human civilisation had culminated in "the American century" (Luce 1941; Stanton 2004a).

More than anywhere else, this patriotic message was confirmed by the awe-inspiring displays of new technologies at the World's Fair. Writers and film-makers had long fantasised about travelling to other planets. Now, in NASA's Space Park, the public could admire the huge rockets which had taken the first Americans into orbit (Editors of Time-Life Books 1964; Laurence 1964). Having started from behind after the Russians launched the first satellite in 1957, the USA was now on the verge of overtaking its rival. America would soon be Number 1 in the "space race" (Schefter 1999). Best of all, visitors to the 1964 World's Fair were told that they too would have the opportunity to become astronauts within their own lifetimes. Inside the General Motors' pavilion, they could see a diorama of Americans in the 1980s taking their holidays on the moon. Other corporations were equally confident that the achievements of the present would soon be surpassed by the triumphs of tomorrow. At its Progressland pavilion, General Electric put on a spectacular demonstration of nuclear fusion which proved that generating electricity was about to become "too cheap to meter" (Editors of Time-Life Books 1964; Laurence 1964). In the imaginary future of the World's Fair, Americans would not only enjoy being space tourists but also be blessed with free energy.

Several corporations believed that the most effective method of proving their technological modernity was showcasing a computer. While most of the mainframes at the 1964 World's Fair were Electro-style gimmicks, IBM dedicated its pavilion exclusively to the wonders of computing as a distinct technology. For over a decade, this corporation had been America's leading mainframe manufacturer. In 1961, one single product – the IBM 1401 – had accounted for a quarter of all the computers operating in the USA (Pugh 1995). In the minds of most visitors to the World's Fair, IBM was computing. Just before the opening of the exposition, the corporation launched a series of products which would maintain its dominance over the industry for another two decades: the System/360 (DeLamarter 1986). Seizing the opportunity for self-promotion offered by an international show, the bosses of IBM commissioned a pavilion designed to eclipse all others. Eero Saarinen – the renowned Finnish architect – created a stunning design for the building: a white, corporate-logo-embossed, egg-shaped theatre suspended high in the air by 45 rust-coloured metal trees. Underneath this striking feature were interactive exhibits celebrating IBM's contribution to the computer industry (Stern, Mellins and Fishman 1997).

For the theatre at the centre of the building, Charles and Ray Eames – the couple who epitomised American artistic modernism – created the main attraction of the IBM pavilion: "The Information Machine". After taking their places in the 500-seat "People Wall", visitors were elevated upwards into the egg-shaped structure. Once inside, a narrator introduced a "mind-blowing" multi-screen multi-media show. The audience learnt that the computers exhibited in the IBM pavilion were forerunners of the sentient machines of the future. Asimov's fantasies would soon become reality; computers were on the verge of acquiring consciousness. The message of IBM's show was clear: the System/360 mainframe was the imaginary future of artificial intelligence in the present (Editors of Time-Life Books 1964; Laurence 1964).

During the twenty-five years following Electro's appearance at the 1939 World's Fair, scientists in university and corporate laboratories had dedicated themselves to building a thinking machine.

Inspired by psychologists who described the mind as functioning like a calculator, John von Neumann had believed that his seminal computer architecture was modelled upon the human brain (McCulloch and Pitts 1943; von Neumann 1966). Following his example, leading researchers in this new field became convinced that the ultimate goal of their efforts was the creation of artificial intelligence. If the mind operated like a machine, then it must be possible to develop a machine which duplicated the functions of the mind. Computers could already calculate faster than their human inventors. Mastering the complexities of mathematical logic was the first step towards endowing these machines with the other attributes of human consciousness. Language was a set of rules which could be codified as software. Learning from new experiences could be programmed into hardware (Minsky 2004, 2004a). During the 1950s, human interaction with a friendly android became a well-loved plot line within American mass culture. In the hit sci-fi film *Forbidden Planet*, the most popular – and memorable – character was an all-powerful sentient machine: Robby the Robot (Wilcox 1958). By the time that the 1964 World's Fair opened, IBM's belief in the imminent arrival of artificial intelligence was shared not only by most experts, but also by large sections of the general public. According to the predictions of the previous decade, the System/360 mainframe must be powerful enough to construct the prototype of a fully conscious computer. In the near future, every American would own a devoted mechanical servant just like Robby the Robot.

"Duplicating the problem-solving and information-handling capabilities of the [human] brain is not far off [in 1960]; it would be surprising if it were not accomplished within the next decade." (Simon 1965, p. 39).

The IBM pavilion's stunning combination of avant-garde architecture, multi-media performance and sci-fi utopianism was a huge hit with both the press and the public. Alongside space rockets and nuclear reactors, the computer had confirmed its place as one of the three iconic technologies of modern America. The ideological message of these machines was clear-cut: the present was the future in embryo. Within at the IBM pavilion, computers existed in two time frames at once. On the one hand, the current models on display were prototypes of the sentient machines of times to come. On the other hand, the dream of artificial intelligence showed the true potential of the mainframes exhibited in the IBM pavilion. As in the exhibits of space rockets and nuclear power, the 1964 World's Fair celebrated the System/360 as the materialisation of the imaginary future.

The Great Exhibition

During the twentieth century, global expositions have focused on publicising the cutting-edge of new technology. Yet, in the Victorian era, these shows started out with a very different agenda. At the height of their power, the rulers of the British empire decided to host the first global exposition: the 1851 Great Exhibition of the Works of Industry of All Nations. In the centre of London, the organisers housed their show in a pioneering glass and iron modernist building: the Crystal Palace. Once inside, visitors were treated to a dazzling display of products from the factories of the "workshop of the world" and exotic imports from the nation's colonies. For its sponsors, the main purpose of the Great Exhibition was to encourage British manufacturers to adopt a very distinct design style. The prime location in the middle of its main hall was allocated to a display of Gothic Revival furniture and religious items (Auerbach 1999). Although inspired by English patriotism, this faux-medieval look deliberately avoided any aesthetic affinity with the foundations of the nation's domination over the world: the industrial revolution. Like the railway stations and public buildings of Victorian Britain, new products in the Crystal Palace were supposed to be disguised as ancient artefacts. Crucially, this retro-style also shaped the politics of nineteenth century Britain. The ruling elite took delight in pretending that their hi-tech commercial republic was a romantic medieval monarchy. In the most modern nation in the world, the latest capitalist innovation was masqueraded as an archaic feudal custom: *the invented tradition* (Hobsbawm and Ranger 1983).

"[England's] essence is strong with the strength of modern simplicity; its exterior is august with the Gothic grandeur of a more imposing age."
(Bagehot 1963, p. 65).

Despite the best efforts of its organisers, aesthetic nostalgia ended up playing a secondary role to technological romanticism at the Great Exhibition. For most visitors, the stars of the show were the machines which were powering the world's first industrial revolution: cotton looms, telegraphy systems, farm equipment, rotary printing presses and, best of all, steam engines. As would happen later at the 1964 New York World's Fair, the host country identified itself as the 'demiurge' of industrial progress and economic globalisation. For patriots, the message of the technology exhibits was clear: Britain was the richest and most powerful nation on the planet because the British invented the best machines (Brain 1993). Gothic Revival furnishings were incapable of matching the emotional impact and social symbolism of working steam engines. Instead of disguising innovations as antiquities, the present was identified with better times to come. The invented tradition had lost out to its dialectical twin: the imaginary future.

Inside the Crystal Palace, none of the items on display were on sale to the general public. Visitors were expected to admire industrial products for their good design rather than for their cheap price. Freed from commercial imperatives, the layout of the awe-inspiring exhibits of raw materials, machinery and finished goods was designed to give an overview of the manufacturing process. Despite this pedagogical intent, these displays systematically ignored the lives of the people who had created the products on show. The silk dresses betrayed no traces of the horrors of the sweatshops where they were made. The glassware from Ireland contained no reminders of the terrible famine which had recently devastated the country (Auerbach 1999; Lyons 1985). By transforming products into artworks, the exhibits inside the Crystal Palace ignored the exploitation and injustice underpinning the manufacturing processes of the "workshop of the world". Public display was – paradoxically – the most effective method of social concealment: "World exhibitions are places of pilgrimage to the commodity fetish" (Benjamin 1999, p. 17; Marx 1976).

With their labour hidden and their price irrelevant, the symbolic role of industrial products took centre stage. Separated twice from its origins in human labour, first through the market and then through the exposition, machinery became materialised ideology. Use value and exchange value had been temporarily superseded by a more esoteric social phenomenon: *exhibition value* (Benjamin 1999). Since the moment of production had disappeared from view, the specific ideology embodied in new technology was open to interpretation. Both bourgeois liberals and working class socialists could find confirmation of their modernist politics in the steam engines of the Great Exhibition. Despite their deep differences about the ideological meaning of new technologies, the two sides agreed on one thing: defining the symbolism of machinery meant owning the imaginary future.

Cold War Computing

The triumph of the Great Exhibition inspired Britain's imperial rivals to host their own international shows. Patriotic pride demanded that every advanced nation staged a spectacular event which asserted its leading role in building the future. In order to fulfil this ambition, global expositions became festivals of mechanical marvels and scientific wonders. Because exhibition value concentrated the public's attention on the symbolic role of new technologies, these displays of industrial innovation could propagate the ideological message of their sponsors: the host nation was the prototype of the imaginary future. At the 1889 Paris Universal Exposition, the superb engineering achievement of the Eiffel Tower immortalised the democratic freedoms of the new French republic. A few years later, the Palace of Electricity at Chicago's 1893 fair provided spectacular proof of the emerging technological superiority of US industry over its European rivals (Chappell 2004; Rose 2004). In the late-1930s, the diverging fortunes of the two continents were dramatically demonstrated by iconography of the expositions held in Paris and New York. Visitors to the 1937 Paris International Exhibition were confronted with the massive buildings erected by Nazi Germany and Stalinist Russia to champion their rival versions of the totalitarian imaginary future. The political and ideological divisions which were driving Europe towards catastrophe were starkly symbolised in brick and concrete (Ryckelynck 1987). Across the Atlantic, the imagery of the American exposition was very different. Visitors to the 1939 New York World's Fair were greeted by exhibits which promised consumer plenty and motorised mobility for everyone. In this competition of ideological symbolisms between the two global expositions, the USA had provided by far the most attractive – and utopian – vision of the imaginary future.

At the 1939 New York World's Fair, the technocratic fantasies of big government and big business had been given visual form in the Democracity and Futurama dioramas. By avoiding any hint of the economic misery and social turmoil in contemporary America, the US elite could emphasise the productive potential of state-regulated corporate capitalism. Yet, despite this prioritisation of exhibition value, these dioramas couldn't totally ignore the use value of their iconic technology. Almost everyone at the 1939 World's Fair had at some point travelled in a motor car. Inside its pavilion, General Motors' latest models were displayed as prototypes of the stream-lined automobiles gliding along the multi-lane motorways in the Futurama diorama. Even though it obscured the social origins of mass produced commodities, the imaginary future of mass consumerism was founded upon the possibilities of a really-existing present.

Since the most famous prophecy of the 1939 exposition had largely come true during the preceding two and a half decades, visitors to the 1964 New York World's Fair could have been forgiven for thinking that its three main imaginary futures would also be realised. Who could doubt that – by 1990 at the latest – the majority of Americans would be enjoying the delights of space tourism and unmetered electricity? Best of all, they would be living in a world where sentient machines were their devoted servants. However, the credibility of these imaginary futures was founded upon a mistaken sense of continuity. Despite being held on the same site and having many of the same exhibitors, the 1964 World's Fair had a very different focus from its 1939 predecessor. Twenty-five years earlier, the centrepiece of the exposition had been the motor car: a mass produced consumer product. In contrast, the stars of the show at the 1964 World's Fair were state-funded technologies for fighting the Cold War. Computers calculated the trajectories which would send American nuclear missiles to destroy Russian cities and their unfortunate inhabitants. While its 1939 predecessor had showcased motorised transportation for the masses, the stars of the 1964 World's Fair were the machines of an "atomic armageddon" (Walker 1994; Isaacs and Dowling 1998).

The 1964 New York World's Fair needed a much higher level of fetishisation to mesmerise its audience. For the first time, exhibition value had to deny the principle use value of new technologies. Whatever their drawbacks, motor cars provided many benefits for the general public. In contrast, space rockets, nuclear reactors and mainframe computers had been invented to vaporise the civilian population of the Russian enemy. Although the superpowers' imperial hegemony depended upon atomic weapons, the threat of global annihilation made their possession increasingly problematic. Two years earlier, the USA and Russia had almost blundered into a catastrophic war over Cuba (Dallek 2003; McNamara 1995). Despite disaster being only narrowly averted, the superpowers were incapable of stopping the arms race. In the bizarre logic of the Cold

War, the prevention of an all-out confrontation between the two blocs depended upon the continual growth in the number of nuclear weapons held by both sides. The ruling elites of the USA and Russia had difficulties in admitting to themselves – let alone to their citizens – the deep irrationality of this new form of military competition. In a rare moment of lucidity, American analysts invented an ironic acronym for this high-risk strategy of "mutually assured destruction": MAD (Kahn 1960).

Not surprisingly, the propagandists of both sides justified the enormous waste of resources on the arms race by promoting the peaceful applications of the leading Cold War technologies. By the time that the 1964 New York World's Fair opened, the weaponry of genocide had been successfully repackaged into people-friendly products. Nuclear power would soon be providing unmetered energy for everyone. Space rockets would shortly be taking tourists for holidays on the moon. Almost all traces of the military origins of these technologies had disappeared. Exhibition value had completely covered up use value.

Like nuclear reactors and space rockets, computers had also been developed as Cold War weaponry. ENIAC – the first mainframe ever built in America – was a machine for calculating tables to improve the accuracy of artillery guns. From the early-1950s onwards, IBM's computer division was focused on winning orders from the American government (Ceruzzi 2003; Pugh 1995). Using mainframes supplied by the corporation, the US military prepared for nuclear war, organised invasions of 'unfriendly' countries, directed the bombing of enemy targets, paid the wages of its troops, ran complex war games and managed its supply chain (Berkeley 1962). Thanks to American taxpayers, IBM had become the technological leader of the computer industry.

When the 1964 New York World's Fair opened, the corporation was still deeply involved in a wide variety of military projects. Yet, just like the displays of fission reactors and space rockets, the computing exhibits at 1964 World's Fair carefully avoided showing the military applications of this new technology. Although IBM had grown rich from government contracts, the corporation's pavilion was dedicated to promoting the sci-fi fantasy of thinking machines. Like the predictions of unmetered energy and space tourism, the imaginary future of artificial intelligence distracted visitors at the World's Fair from discovering the original motivation for developing IBM's mainframes: killing millions of people. Visitors were supposed to admire the achievements of US industry not to question its dubious role in the arms race. The horrors of the Cold War present had been hidden by the marvels of the imaginary futures.

Cybernetic Fordism

At the 1964 World's Fair, sci-fi fantasies did temporarily succeed in concealing the primary purpose of its three iconic technologies from the American public. But even the finest-crafted exhibition values couldn't hide dodgy use values for ever. As the decades passed, none of the predictions made at the World's Fair about the key Cold War technologies were realised. Energy remained metered, tourists didn't visit the moon and computers never became intelligent. Unlike the prescient vision of motoring for the masses at the 1939 World's Fair, the prophecies made about the star technologies of the 1964 exposition seemed almost absurd twenty-five years later. Hyper-reality had collided with reality – and lost.

Like the displays of nuclear reactors and space rockets, the computer exhibits at the 1964 World's Fair also misread the direction of technological progress. Yet, there was one crucial difference between the collapse of the first two prophecies and that of the last one. What eventually discredited the predictions of unmetered electricity and holidays on the moon was their failure to appear over time. In contrast, scepticism about the imaginary future of artificial intelligence was encouraged by exactly the opposite phenomenon: the increased likelihood of people having personal experience of computers. After using these imperfect tools for manipulating information, it was much more difficult for them to believe that calculating machines could evolve into sentient superbeings (Nelson 1987).

Despite the failure of its prophecy, IBM suffered no damage. In stark contrast with nuclear power and space travel, computing was the Cold War technology which successfully escaped from the Cold War. Right from the beginning, machines made for the US military were also sold to commercial clients (Pugh 1995). By the time that IBM built its pavilion for the 1964 World's Fair, the imaginary future of artificial intelligence had to hide more than the unsavoury military applications of computing. Exhibition value also performed its classic function of concealing the role of human labour within production. Computers were described as 'thinking' so the hard work involved in designing, building, programming and operating them could be discounted. Above all, the prophecy of artificial intelligence obscured the role of technological innovation within American workplaces.

The invention of computers came at an opportune moment for big business. During the first half of the twentieth century, large corporations had become the dominant institutions of the American economy. Henry Ford's giant car factory became the eponymous symbol of the new social paradigm: Fordism (Ford and Crowther 1922; Aglietta 1979). When profitable, corporations replaced the indirect regulation of production by markets with direct supervision by bureaucrats. As the wage-bill for white-collar employees steadily rose, businesses needed increasing amounts of equipment to raise productivity within the office. Long before the invention of the computer, the bureaucracies of Fordist corporations were running an information economy with tabulators, typewriters and other types of office equipment (Beniger 1986). However, by the beginning of the 1950s, the mechanisation of clerical labour had stalled. Increases in productivity in the office were lagging well behind those in the factory. When the first computers appeared on the market, corporate managers quickly realised that the new technology offered a solution to this pressing problem. The work of large numbers of tabulator operators could now be done by a much smaller group of people using a mainframe (Berkeley 1962; Sobel 1981). Even better, the new technology of computing enabled capitalists to deepen their control over their organisations. Much more information about many more topics could now be collected and processed in increasingly complex ways. Managers were masters of all that they surveyed.

Almost from its first appearance in the workplace, the mainframe was caricatured – with good reason – as the mechanical perfection of bureaucratic tyranny. In Asimov's sci-fi stories, Mr and Mrs Average were the owners of robot servants. Yet, when the first computers arrived in America's factories and offices, this new technology was controlled by the bosses, not the workers. In 1952, Kurt Vonnegut published a sci-fi novel which satirised the authoritarian ambitions of corporate computing. In his dystopian future, the ruling elite had delegated the management of society to an omniscient artificial intelligence.

"EPICAC XIV ... decided how many [of] everything America and her customers could have and how much they would cost. And it ... would decide how many engineers and managers and … civil servants, and of what skills, would be needed to deliver the goods; and what I.Q. and aptitude levels would separate the useful men [and women] from the useless ones, and how many ... could be supported at what pay level..." (Vonnegut 1969, p. 106).

For business executives, Vonnegut's nightmare was their computer daydream. As mainframes increased in power, companies were able to automate more and more clerical tasks. According to the prophets of artificial intelligence, the computerisation of clerical work was only the first step. When thinking machines were developed, mainframes would completely replace most forms of administrative and technical labour within manufacturing. The ultimate goal was the creation of the fully-automated workplace (Simon 1965). In the imaginary future of artificial intelligence, the corporation and the computer would be one and the same thing.

As the US military had already fortuitously discovered, some types of machinery could operate much more efficiently without any human intervention. By building predetermined responses into the design, an inanimate weapon acted according to 'feed-back' from its environment. According to Norbert Wiener, these self-regulating technologies had been forerunners of the computer. In turn, the advent of mainframe heralded the remoulding of the whole of society in the image of a new technological paradigm: *cybernetics*.

"The notion of programming in the factory had already become familiar through the work of [the management theorist] Taylor ... on time study, and was ready to be transferred to the machine. ... The consequent development of automatisation ... [is] one of the great factors conditioning the social and technical life of the age to come..." (Wiener 1967, pp. 204-205).

The corporate vision of cybernetic Fordism meant forgetting the history of Fordism itself. This economic paradigm had been founded upon the successful co-ordination of mass production with mass consumption. Ironically, since their exhibition value was more closely connected to social reality, the Democracity and Futurama dioramas in 1939 provided a much more accurate prediction of the development path of computing than the IBM pavilion did in 1964. Just like motor cars twenty-five years earlier, this new technology was also slowly being transformed from a rare, hand-made machine into a ubiquitous, factory-produced commodity. IBM's own System/360 series of computers – launched in the same month as the 1964 World's Fair opened – was at the cutting-edge of this process. Like Ford's motor cars before them, IBM's mainframes were manufactured on assembly-lines (Pugh, Johnson and Palmer 1991). These opening moves towards the mass production of computers anticipated what would be the most important advance in this sector twenty-five years later: the mass consumption of computers.

The imaginary future of artificial intelligence was a way of avoiding thinking about the likely social consequences of the widespread ownership of these machines. In the early-1960s, the Big Brother mainframe belonged to big government and big business. Above all, feedback was knowledge of the ruled monopolised by the rulers. However, as Norbert Wiener himself pointed out, Fordist production would inevitably transform expensive mainframes into cheap commodities. In turn, increasing ownership of computers was likely to disrupt the existing social order. For the feedback of information within human institutions was limited when decision-making was centralised into the hands of a few top managers. Instead, the most effective method of operating was the uninhibited two-way flow of communications and creativity across the whole organisation. By reconnecting conception and execution, cybernetic Fordism threatened the social hierarchies which underpinned Fordism itself.

"... the simple coexistence of two items of information is of relatively small value, unless these two items can be effectively combined in some mind ... which is able to fertilises one by means of the other. This is the very opposite of the organisation which every member travels a pre-assigned path..."
(Wiener 1967, p. 172).

At the 1964 World's Fair, this possibility was definitely not part of IBM's imaginary future. Rather than aiming to produce ever greater numbers of more efficient machines at cheaper prices, the corporation was focused on steadily increasing the capabilities of its computers to preserve its near-monopoly over the military and corporate market. Instead of room-sized machines shrinking down into desktops, laptops and, eventually, mobile phones, IBM was convinced that computers would always be large and bulky mainframes. The corporation fervently believed that - if this path of technological progress was extrapolated - artificial intelligence must surely result. Crucially, this conservative recuperation of cybernetics implied that sentient machines would inevitably evolve into life forms which were more advanced than mere humans. The Fordist separation between conception and execution would have achieved its technological apotheosis.

Not surprisingly, IBM was determined to counter this unsettling interpretation of its own futurist propaganda. At the 1964 World's Fair, the corporation's pavilion emphasised the utopian possibilities of computing. Yet, despite its best efforts, IBM couldn't entirely avoid the ambiguity inherent within the imaginary future of artificial intelligence. This fetishised ideology could only appeal to all sections of American society if computers fulfilled the deepest desires of both sides within the workplace. Therefore, in the exhibits at its pavilion, IBM promoted a single vision of the imaginary future which combined two incompatible interpretations of artificial intelligence. On the one hand, workers were told that all their needs would be satisfied by sentient robots: servants who never tired, complained or questioned orders. On the other hand, capitalists were promised that their factories and offices would be run by thinking machines: producers who never slacked off, expressed opinions or went on strike. Robby the Robot had become indistinguishable

from EPICAC XIV. If only at the level of ideology, IBM had reconciled the social divisions of 1960s America. In the imaginary future, workers would no longer need to work and employers would no longer need employees. The sci-fi fantasy of artificial intelligence had successfully distracted people from questioning the impact of computing within the workplace. After visiting IBM's pavilion at the 1964 World's Far, it was all too easy to believe that everyone would win when the machines acquired consciousness.

The Future Is Not What It Used To Be

Forty years later, Honda announced it would be putting on its own show about the wonders of artificial intelligence at Disneyland. Just like IBM in the early-1960s, the corporation confidently predicted that it will be producing sentient machines in the "not-too-distant future". As with the System/360 mainframe at the World's Fair, the Asimo robot will be displayed as the prototype of the fully-conscious models to come. Once again, visitors to a public exhibition are going to be told that they will be able to buy a robot servant within their own lifetimes. Science fiction dreams will soon become everyday reality (Honda 2005).

Ever since the 1950s, the creation of a thinking machine has been just-around-the-corner. In the same way that IBM identified the System/360 mainframe with Robby the Robot, Honda publicised the Asimo as if it was an early version of Data. The brand names and cultural references may have changed, but the prediction remained the same. Yet, despite the dramatic advances in hardware and software which have taken place in the intervening period, computers were still no closer to being able to 'think' in 2005 than they were in 1964. Crucially, this technology followed a completely different development path from that predicted by the boosters of artificial intelligence. Instead of acquiring consciousness and remaining the size of a room, mainframes have become consumer items by shrinking into smaller and smaller machines. As computers became ubiquitous in the modern world, their users learnt from first-hand experience that they couldn't 'think' for themselves.

Bizarrely, the repeated failures of the Silicon Messiah to appear at the appointed times haven't discredited the imaginary future of artificial intelligence. By always emphasising the wonders to come, its prophets have carefully avoided talking about the disappointments of the past. Their future has no history. Over the last four decades, this theoretical legerdemain has found a willing audience among corporate sponsors. Honda in the early-2000s was as eager as IBM was in the early-1960s to promote its products as forerunners of sentient machines. Within capitalist societies, commodity fetishism occludes the social origins of new technologies. By putting them on public display, exhibition value adds a further degree of separation between their creation and consumption. In Disneyland, Honda can use the Asimo to symbolise its sci-fi advertising message. The thinking machine will be the friend of humanity which can tend the infirm and perform dangerous tasks. As in IBM's exhibit at the 1964 World's Fair, this iconography of technology will carefully ignore the more dubious motivations for developing artificial intelligence. With the US military already over-stretched by its imperial commitments overseas, Honda's executives must have known that the market for robot warriors was likely to be far more lucrative than that for mechanical nurses. When it is being hyped as the first iteration of loveable Data, Asimo was also – implicitly – seen as the prototype of the murderous Terminator.

Like IBM's exhibit at the World's Fair forty years earlier, Honda's show at Disneyland will celebrate the imaginary future of artificial intelligence to distract the public's attention from conflicts in the here and now over which class gains the most from the adoption of new technologies within the workplace. The corporation predicted that both sides of industry will welcome the arrival of sentient robots. On the one hand, consumers will be able to buy mechanical servants to look after their homes. On the other hand, businesses will be able to hire robot workers to carry out complex tasks. But, just like IBM in the early-1960s, Honda has promoted a vision of computing which benefits one class more than the other. As its own publicity admitted, the Asimo was designed to replace expensive skilled workers like nurses and fire-fighters. For managers, the sentient robot would be the ideal employee who obeys orders without question and has no desire to join a trade union. Once again, artificial intelligence was sold as the technological fix to the social problems caused by the top-down hierarchy of Fordism. If the workers are discontented, sack them and get some Asimos to do the job instead.

When its robot goes on public display in Disneyland, Honda will claim that this authoritarian concept of computing is the path to the future. As in IBM's exhibit at the 1964 World's Fair, the message will be that machines can – and should – replace humans. Ironically, this is a future which is already history. As Wiener predicted, the mass production of computers has undermined the social disciplines of Fordism. Above all, his hopes for the democratisation of communications and creativity have been fulfilled by the rapid spread of the Net. Instead of being monopolised by the military and management, computers have also become tools for self-expression and collaborative working. In the early-2000s, user generated content and open source software were the cutting-edge of hi-tech modernity. At the same time that Honda was predicting that machines would replace humans, people in the developed world were integrating computers into all aspects of their lives. Confirming McLuhan's famous phrase, this technology has become the 'extension' of human capabilities (1964). Entranced by Asimo's exhibition value, some visitors to Disneyland may be persuaded that the imaginary future of artificial intelligence is imminent. But, on leaving this amusement park, they will return to a world where a large proportion of the population have learnt how to master computers. Instead of being replaced by robots, humans can now dream of symbiosis with their machinery. Asimo is the symbol of an imaginary future from the past. In the emerging networked society, socialist-feminist cyborgs and digital artisans are the new icons of the future, where the masses will use computers to reshape the world in their own interests (Haraway 1991; Barbrook and Schultz 1997). Let's be inspired and passionate about imagining our own visions of the better times to come.

See also the Imaginary Futures website: www.imaginaryfutures.net

De Nederlandse vertaling van deze tekst is te vinden op www.muhka.be/AS

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