The Evolution of Wired Life

From the Alphabet to the Soul-Catcher Chip—
How Information Technologies
Change Our World

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Prologue

My maternal great-grandmother, Janina Suchorzewska, spent her early childhood in the city of Krakow. By the standards of the time, the 1870s, Krakow was a flourishing town, a busy seat of commerce and manufacture within the Austro-Hungarian empire, and a former capital of Poland. Yet the conditions in which people lived – reading by oil-lamp, bathing in water pumped by hand from a well, travelling about only on foot or by horse-carriage – had changed little in hundreds of years. Life there, as elsewhere in Europe and North America, could still pass for medieval in many of its daily routines.

She was to live through a period of technological change more dramatic than has been experienced by any other generation, before or since. As she approached the age of ten, electricity came into practical use; in 1879 Thomas Alva Edison invented the lightbulb in New Jersey and Ernst von Siemens built the first electric streetcar in Berlin. By the time of Janina's fifteenth birthday, German engineers had

put gasoline engines into vehicles. Henry Ford, pioneer of mass production, began manufacture in the USA in 1896, and by 1900 powered automobiles started to replace horse-carts in large quantities. Just three years later the Wright brothers made the first powered flight, fulfilling a dream which had fascinated mankind since the earliest times.

The outbreak of World War One in 1914 brought horrifying confirmation of the rate of technological change. Aeroplanes fought in the sky and huge factories churned out munitions and chemical weapons for a conflict which, in terms of human cost, had no precedent. The ensuing years brought further breakneck developments in science and technology. Plastics appeared commercially in the 1920s, as did mass-produced steel. Skyscrapers began to dominate city skylines. Electricity was fed to every city house, providing power for lighting, pumps, kitchen appliances and the first electronic radios and sound systems.

In the 1950s, in the boom years following the end of World War Two, most of the remaining elements of modern industrial life were put in place. Domestic appliances from washing machines to vacuum cleaners became ubiquitous. The countryside was crisscrossed with asphalt highways on which travelled cars at up to and over 150 kilometres per hour, the best of them equipped with power steering, electrically adjusted seats, air suspension and automatic transmission. The first commercial jet was in service by 1952, and intercontinental air travel became routine. In 1959 the Soviet spaceprobe *Lunik 2* reached the moon. Technology had advanced from horse-drawn carts to space travel in a single lifetime.

The transition from the nineteenth to the twentieth century had been a period not only of great technological change but also of unprecedented political and social upheaval. In the still peaceful 1890s, Janina Suchorzewska went to Munich to

study art and the piano – universities offered only genteel topics to women in those days. In the early 1900s, with military stormclouds gathering over Europe and with her beloved Poland under foreign annexation, she returned to Krakow. Caught running weapons, she was tried and faced the death penalty, but was pardoned. Surviving also World War One, she earned a doctorate in philosophy; later, when the doors of the profession were finally opened to women, she gained another degree, in medicine. She ended her working life a practising physician, determined to use the medical sciences to repay society for the considerable privileges which it had bestowed on her in her youth.

She was still healthy and active at the age of 94 when she died after a street accident outside the apartment she had occupied for most of her eventful near-century of life.

The sense in the mid-twentieth century was that technological progress would march on uninterrupted. By the year 2000, it was assumed, the life of the modern urban dweller would be mechanized, accelerated and streamlined to as yet unthought-of levels. There would be no traffic jams. The modern citizen would travel around the city by a variety of exotic means: ultralight electric runabouts for inside the house and within the immediate neighbourhood, and jet-powered vehicles for highway travel. The home of the future would be dramatically transformed by technology; the family would sit back and relax as self-propelled devices discreetly cleaned the rooms and prepared the meals.

Hopes were high for our ability to deliver material comforts to all and to overcome the problems of poverty and sickness. The US physician Lowry H. McDaniel typified the sentiments of the time when he wrote in 1956 that, by the end of the century, 'starvation and famine will be prevented by synthesis of foodstuffs'. Likewise, he argued,

infectious disease would have been eliminated and cancer successfully treated.

None of this has happened. In Paris and New York, the patterns of day-to-day life are broadly unchanged. Some new architectural styles and models of cars have appeared, but traffic still tails back, as it has for decades, at the approaches to the cities. People walk along the same streets and avenues, between offices and apartment blocks, coffee shops and restaurants. The infrastructures supplying gas, electricity and water still date in large part from the first half of the century.

Our lifestyles have not been transformed by rocket travel, magnetic levitation or automated houses. Remarkable though it might seem to the optimistic futurist of 1950, fifty years on we are still pulling up at the same petrol stations to fill the tanks of cars that have internal combustion engines, pistons and crankshafts, gearboxes and differentials. We end this half-century much as we began it, using ironing boards to press our clothes, vacuum cleaners to do the cleaning and a wrench to fix a leaking tap. Infectious diseases and cancer are still rife.

Instead, four decades ago, technology took a curious turn. A new generation of researchers in scientific and technological laboratories chose to work not on making tougher steels and bigger rocket engines but on etching myriad logic gates into strips of silicon, and on writing software that would turn these silicon circuits into problem-solving machines. The technology of the future was to be the electronic manipulation, storage and transmission of information. This technology was to create a world of keyboards and screens, of multimedia and video games, of electronic highways. The digital age had been born.

I chose to be part of that information technology future. My first job, after studying electrical sciences at university,

was with IBM, writing software; my second was in a research lab, designing hardware. Along with many thousands of others of a technological bent embarking on professional life in the 1970s and 1980s, I nailed my flag to the digital mast.

I did not regret my choice. The triumph of the new industry now seems complete. The term 'high technology' has become synonymous with computer technology. By 1990 US business was spending more on office equipment to automate the handling of information than on all the technology of physical production put together – factory equipment, petrochemical complexes, transportation systems, construction projects, and the like. Microsoft Inc. produces software – 0s and 1s encoded magnetically on disks – yet it is worth more on the stock exchange than the whole of the US automobile industry, the epitome of industrial mass production, put together.

In terms of their impact on our physical surroundings, these new computing devices have not been the equal of the huge machines of the industrial era. The key to their significance has been something both more fascinating and more disconcerting: their ability to simulate our mental processes. Because the new technology is one of information, ideas and intelligence, of mental not of physical prowess, it may change not only our relationship to the objects around us but even our relationship to ourselves. *Time* magazine's Man of the Year for 1982 was not Nelson Mandela or the Pope, though both would appear on the cover shortly, but the computer. The new guiding idea was not computer-as-tool but computer-as-person. When chess world champion Kasparov was about to take on the computer Deep Blue in 1997, commentators asked what this meant for our conception of ourselves. On the eve of the game, David Levy wrote in the British newspaper the *Guardian*: 'Garry Kasparov will sit down at a chessboard in

Manhattan and defend humankind from the inexorable advance of artificial intelligence.'

It was Man versus Machine, in that king amongst mind-games.

We lost.

A great deal is being written – in books by futurists and technical experts or in newspaper interviews with leaders of the new industry – about the impact which this technology will have upon us. Its powers of logical manipulation will transform the way our lives are led. Computers will take better decisions in business, will bring in a more rational era in politics, will lead to a more objective evaluation of ourselves and our needs, both individually and as a society. Networks will put at our disposal an ever richer virtual world, an ever greater ability to manufacture images and sounds which inform and entertain us. We will be exposed less to live contact and the serendipity of chance encounters.

Bombarded by talk of new developments in computing, it is easy to get the idea that computers will soon create a world which is very remote from the one we have known, one ill-adapted to our traditional needs and desires. And worse, that it is we and not the machines who are going to have to do the adapting – as computers permeate more and more of our daily routines, we will have no choice but to bow before the superiority of their strict logic, their black-and-white categorization.

But there is an alternative view, one that is both more sceptical and more intuitive. This runs: 'I don't know much about computers, but I do know that there is more to me and you and the millions of people around us and the social and economic institutions we have built up than these machines can dominate so readily. We may not be as logical as they are but we are creative, and have a way of thinking and feeling which has been honed through the millennia-

long evolution of human civilization. We should not rush to change our ideas and values in response to a technology which, though impressive, is not *overwhelmingly* so. We have seen huge revolutions in the past, and we will no doubt see more in the future.'

The more I learned about the new technology, the clearer a picture I gleaned of both its potentialities and its limitations. Computers are remarkable, but the human mind is still in a league of its own; for better or worse, software and silicon will not make the inroads that their enthusiasts foretell. In the digital age the drama of human life will still be played out between people, not between machines. To take on the challenges of twenty-first-century life, students would be ill-advised to drop literature and history in favour of computer science. They will still need to understand human nature more than they will the details of this or any other technology.

Scientific vocabulary and some fabulous success stories give the impression that the new technology's practitioners have an inside track on the future. But, while we should be thankful to the computer fraternity for its creations, we do not need to accept its view on how society will choose to adopt them. On that subject anyone is entitled to a view. The debate is not about what technology can do (on this there is general agreement) but about who we are in the digital age. The insights needed are not technical – a summary of the fundamentals will do – but humanistic, a sense of how people interact in society. Here members of the computer community have no monopoly of understanding.

This book has been written for those who want to know more about this side of the argument.