

The Worshipful Company of World Traders

The XIVth World Traders' Tacitus Lecture

Delivered at the Guildhall in the City of London on

8th February 2001

by

Dr David Potter, Chairman Psion plc

“The New Economy: Fact or Fantasy?”

Introduction

Master, Aldermen, Ladies and Gentlemen, I thank you for this invitation to give the 2001 Tacitus Lecture. A fall in financial markets in technology has at least the benefit of encouraging humility among those of us who are practitioners. And if there is one thing I have learnt as an entrepreneur for twenty years it is humility coupled with a questioning of conventional wisdoms. This is therefore a good time to take stock and examine the question “Is there a New Economy in the making and what is its wider import?”

1901 marked the peak of a great stock-market boom. The new technologies of electricity, the motor car, the promise of heavier than air flight and the telephone and telegraph beckoned towards a radical future. There was a great exposition in Buffalo, New York with a tower of 44,000 new Edison light bulbs – this in an age of candles and dark nights. A telegraph wire transmitted a picture.

One year later the market had crashed and continued to do so. Notwithstanding financial markets, a new economic age of electricity, telecommunications, motor and air transport, movie industries and music was created. The following thirty-five years saw a transformation in the economic life of Europe and America, driven by those very technologies. There were transformations, too, in the processes of business, such as Henry Ford's assembly line. And there were changes to the macro-economic structure that wrought both good and evil.

One hundred years later we have seen an extraordinary bull market, particularly in America. The drivers have been a very long period of economic expansion from a very slack base, radical change in the firm and in the ways of doing business and the increasing impact of the digital revolution. This reached its apogee in the latest fashion, a mind-bending, dot-com frenzy in early 2000.

Today many are asking, “Is or was the New Economy a Fact or Fantasy?” I want to demonstrate in a wide perspective why the new economy is a fact and why a profit-less world is fiction. I hope to project through the scale, duration and generality of the change that is being wrought, the import of a revolution as profound as any in human economic history.

What is “The New Economy?”

What is the new economy? Ask someone from the media and they will describe the Internet and the “Dot.com” phenomena. Perhaps fund managers will describe the same. Ask an American economist and he may today describe increasing productivity as the driver of a new growth regime. Ask an executive in a multi-national and he or she will refer to a new way of organizing business. Was it forecast? Yes, by many in the technology industries, but not generally among economists or fund managers in the UK. Ten years ago the productivity paradox was identified by the Nobel Prize-winning economist, Robert Solow, who pointed out even then that the computer age was everywhere except in the productivity statistics. Indeed, only twelve years ago, executives were rushing to Japan to discover how to run their businesses.

I believe the phrase “New Economy” refers to a disruptive and radical change in the way businesses are structured, how they organize themselves, where competitive advantage lies and how the resulting economy operates. It is a phrase that refers to a revolution, comparable or greater to that of the industrial or agrarian revolution. And the core driver to that revolution is technological – the digital revolution. The tide of this revolution has been coming in with increasing speed over the last twenty-five years and it will continue for at least another twenty-five years. The Agrarian revolution was a productivity revolution that allows all food production in the West to be produced by only 3% of the population compared to most of the population a few hundred years ago. The industrial revolution, based on power and the machine,

facilitated the mass production of goods and in turn absorbed half the working population as little as fifty years ago.

In 1979, I recall the Prime Minister of the time, Jim Callaghan, talking of the significance of the coming “Chip”. He was right. And what the chip facilitates is software. Software is not just software. Software is the “Virtual Machine”. It is weightless and infinitely variable; it can drive automation and robots; it can facilitate remote communications at the other end of the world; and replace mechanical systems; it can investigate and query and deal with the abstract. As power and the idea of the machine to carry out repetitive tasks were the drivers of the industrial revolution, so software, as the virtual machine, is the driver of this new revolution. But the generality of the virtual machine far exceeds that of the mechanical machine. In truth we are only at the beginning and we don’t know the limits of where this will take the world.

The globalisation of the world economy, the structure of the firm, the way we do business, the automation of production, the nature of the world of media and our access to information, have all been driven primarily by the chip and the virtual machine. This is what we mean by this phrase “The New Economy” and it has been going on relentlessly and with increasing momentum for the last twenty-five years.

But in 1999 and early 2000 a small wave in this tide of change caught the popular and financial imagination. We saw a frenzy of excitement for what start-up, dot-com companies could do and how these business tadpoles would overwhelm the giants of business and of retailing particularly. The imagination spread to venture capital and financial markets so that the flimsiest and most absurd “Hans Christian Anderson” business model was believed and attracted investment. Peabody, an upstart, digital grocer in Boise Idaho, would replace Krogers – and indeed for a time was more highly valued. Pet food would be ordered digitally and magically delivered. And the aptly named “Lastminute.com” was there at the last minute. Two partners of a revered leading consultancy company wrote a fantastic article in the Harvard Business Review on “How to Value Internet Companies”. This was as magical in its valuations as the wild conceptions of the Alchemists in their time. I recall that in 1983 there was a far smaller but similar excess.

It will be understandable, but a great mistake, to associate “The New Economy” with this recent fantasy. Look back twenty-five years and look forward twenty-five years and we shall see that a New Economy of profound change is being created.

Economic, political and technological dimension

There is also a wider interlaced context involving political and global forces. We are all aware of the increasing globalisation of the world economy. This is a world of greater economic interdependence, lower trade barriers, the greater specialization of nations and hugely increased trade. Political forces have encouraged this process. Following the Second World War, the leading nations determined to avoid the terrible events of the first half of the twentieth century by building a world of mutual reliance. World organizations such as GATT, the IMF, the World Bank couple with the demise of the Soviet Union hastened globalisation. But all of this has been facilitated by technology that allows instantaneous communication across the world, global finance and the efficient movement of capital and goods.

The Technology Driver

The Digital Revolution has been happening since 1975 and will continue until at least 2025. I want to demonstrate that long-term perspective by illustrating the exponential scale of development over many years. It is the same effect as compound interest of 60% per annum over twenty five years, something known as Moore’s Law in the industry.

Here are a few examples of the startling pace of digital development

- Over the last nineteen years, computer capacity in the world has increased from 500,000 to 20 billion megaflops.
- In the last twenty years memory on a single chip has increased twenty thousand times.
- In 1982, a hard disk had 640,000 characters of information storage. Today on your PC there are twenty thousand million characters of information.
- In 1980 a flat screen digital display could show about ten characters. Today it can show the equivalent of about 100,000 characters as graphical images in colour.

- In 1980 there were some 100,000 people who used something called the Internet, derived from a military program – Arpanet - for primitive email. Today there are over three hundred million users of a network covering the world with four million interlinked servers, each with vast memory. Together they provide communications and a library on a scale that could not have been imagined.
- Fibre cables today carry digital information at a speed of fifty thousand times that of analogue signals down copper wires in 1975.

I can go on. The science behind all this is solid state physics from the twenties and thirties. The digital revolution is being driven by the application of this science and the huge well of development it has facilitated. This applies to all the components of the digital world - cables, fibre optic components, chips, LCD's, disk drives, wireless transmission and signal processing.

Today, Yesterday and Tomorrow – A Long Term Perspective

How has this already affected our everyday lives and the businesses in which we work? The impact is like taking a train from the coast up into the mountains. Watch from the windows for a few minutes and the landscape doesn't seem to change. Fall asleep for two hours and the landscape changes beyond recognition.

As an overall perspective, I estimate that in 2000 the turnover of this industry in information, communications, appliances and services amounts to some \$2.5 trillion and accounts for some 6 - 7% of world GDP. It is probably now the largest industry in the world and the most rapidly growing.

- Cast your mind back to 1980 and think of the typical office. People used typewriters. There was a rigid hierarchy and pyramid structure so that each manager could pass information to six people down the organization.
- The main means of communication were the letter and memo. And sometimes the telephone. Today the PC has replaced the typewriter, while secretaries have largely gone. And the hierarchy has been replaced by flat organizations communicating predominately by E-Mail

- The PC in the eighties was a productivity tool. It was first used for spreadsheets and business planning, word-processing and database management.
- In the early nineties a further revolution took place as PC's became networked together. This led to their current and central function as the core communication tool of the organization.
- Long ago, in 1984, most export business was done on a telex machine with a speed of 8 bytes a second. Yesterday there was the fax. Today in business we transfer files of all kinds and information through the network of networks at a million bytes a second – the Internet.
- In 1979 long lines of assembly workers manually managed tools for the mass assembly of products. Today this is mostly carried out by robots so that the world is swimming in an excess of manufactured goods. And employment on the assembly line has fallen from 45% in 1951 to 13% today. But manufacturing output in Britain and America is higher today than twenty years ago.
- Un-noticed but ubiquitous is the chip as the control mechanism in almost every durable device – motor cars, ovens, washing machines, heating systems, security systems, television or coffee machines. This has simplified the manufacture of these devices, reduced cost and added to utility.
- Today you order your books or airline tickets through the net and you can research any topic as if you were sitting in a thousand libraries.

On reflection, there has been enormous change at work and in our personal lives.

Future Change

And what of the next twenty-five years? We can gain some perspective of where the impacts will be by first appreciating how much of our worlds are concerned with information. Before our ability of today to maintain, see and store information in a virtual digital form, mankind invented all kinds of metaphors for information. For example traditional forms of money such as gold, cash and coins are physical metaphors for information. In business the same was true of inventory or stock. We did not know how much of it there was in our distribution chains, with our

customers or our suppliers so we kept great stockpiles in factories and warehouses - simply to count it. The world was awash with inventory because that was the only way we could gain information about it. And hence business cycles were coupled to stocking or de-stocking.

Photographs and maps are simply visual information in physical form. And so are vinyl records, cassettes, and CDs for music. Movies, books architectural drawings, mechanical governors in old machines, X-rays and medical diagnostics are all forms of information. Historically and significantly still today, all of these things are physical goods, manufactured and produced, but their sole role is to feed us information. And all of these things will disappear to be replaced by digital files that we will access in the future directly through our senses.

It is only a matter of time before books are replaced by digital reading scrolls or tablets and the world's libraries can be accessed wirelessly for any volume you wish on a Caribbean beach.

In the sophisticated world of the West, our needs for physical things for the body are small compared to the input and interaction we require for our minds and senses as human beings. And increasingly those physical or tangible things are easily produced through automation by the virtual machine in the form of robots. Those physical things include food, clothing, housing, heating and transport.

Let me add a little flavour through one example. Even the need for much traveling can be reduced and both much pleasure and productivity added in what I shall call “The *virtual meeting room*”, or “*virtual travel room*” in the house, or office.

Teleconferencing is the poor harbinger of this, but I suspect this will be replaced in due course by massive wall to wall digital plasma screens and audio surround with corresponding audio and video input to represent closely the experience of being with someone or a group, though you are six thousand miles away. With display technology, software and fibre optic cable this is not fanciful but will come to be applied widely in the next twenty years. A vast array of new applications will be facilitated over the next five years with the roll-out of ubiquitous bandwidth in the home, at work, and by wireless.

How this will change the Structure of Business and Economy

How will all this change the structure of businesses and the firm? And how is this changing the economy? There are fundamental questions to ask in business. Where is value added? And in Porter's phrase what will be the sources of competitive advantage in the future?

Classical economic theory talks of:

“The Capital Stock”;

“Labour”;

“Natural Resources”,

namely physical assets, as the drivers of wealth. If we think in classical terms of the archetypal capitalist, Lord Nuffield, we think of the enormous capital in machinery and stock sunk into Morris Motors. Economists talk of the Q factor relating the value of business to its asset value. And indeed there are economic theories which say that if the value of businesses exceed their asset value, new businesses will be created until the greater supply reduces the value back to the cost of the assets. That's logical and intuitive, but it does not seem to work very well anymore. Indeed if we believe even a small part of the value of Wall Street or London, market values have diverged wildly from their asset values. Something strange is happening.

We can still understand the concept of natural resources as a driver of wealth. BP-Amoco in oil is a great example. But compared to thirty years ago, the value associated with natural resources is proportionately modest today.

In 1984, the ten largest firms by value quoted on the London Stock Exchange were BP; Shell; GEC; ICI; BAT; Glaxo; Marks & Spencer; Grand Met; BTR and Beecham. Their combined market value was £40 billion while their net assets were £40 billion and they employed some 1 million people, largely in Britain. Two were natural resource companies, none were banks, one a retailer, four were industrial companies, and two of the smallest were pharmaceutical companies. Classical economic terms described that world well.

Today the ten largest firms are Vodaphone, BP-Amoco, GlaxoSmithKline, HSBC, Shell, AstraZeneca, BT, Royal Bank of Scotland, Lloyds-TSB and Barclays. Their combined value is currently £770 billion and their net worth is some £150 billion.

They employ about a million people. Two are natural resource companies; four are banks; and four are something new - IPR or franchise companies. Not one is there for its capital stock and not one is an industrial company. This is a very different world from 1984.

And in America the picture is much starker. The highest value companies include Microsoft, Intel, Merck, Cisco and Disney many of whom hardly existed twenty years ago. They are all characterised by their IPR. Their value bears no relation whatsoever to their net worth or capital stock.

The competitive advantage of the firm and of nations increasingly derives from intellectual assets and franchises. Knowledge stock relates to the know-how of the firm. It resides in patents, copyright, design and the systems of the firm. It resides in franchises that a firm builds up such as Vodaphone.

The establishment of this value does not derive from “capital investment”. It derives from research and development, such as that in Glaxo or Microsoft. It derives from losses as a firm establishes a franchise such as Vodaphone, B Sky B or cable companies. The truth is that today value derives from the *intellectual ownership or knowledge assets of the firm*, or through some captured franchise. There is now abundant statistical evidence that over a five or ten year timescale profit and value follow expenditure in research and development – not just in technology but in new business methods.

There is another dimension to the business environment of today – and that is change. The underlying driver is technological and that in turn has produced a revolutionary environment of such volatility that management practice and theory today is based on the radical and on change. Listen to management gurus like Tom Peters and they sound like Russian revolutionaries before 1917. What this demonstrates is a premium on empiricism and innovation in business practice and structure. Hence one hears continuously questions such as: “How can we delayer our business to cut costs since all employees can have management information directly?” “How do we re-structure our logistics and lower inventory because we now have the information on our own stocks, that of our suppliers and of our customers?” “Living in a global, communicating and information-rich world, what is the core value we add to the market and how can we outsource other activities anywhere in the world to those who can do it better?”

This is the New Economy. Its driver might be technological but its effect is to change the structure of the firm and the economy.

Financial Markets

Twenty-five years after the first microprocessor chip, I have taken a long-term perspective of its pervasive effect, the associated technologies it facilitates, and the virtual machine that changes the world. I have demonstrated how the worlds of business, the office, and the factory are experiencing traumatic change as a direct result and how our private, social and home worlds are changing.

Since we are in the City and the Guildhall, it is appropriate to bring this together by asking what are the lessons for public policy and what are the lessons for capital and financial markets in this new environment? During the eighties and first half of the nineties, investment in London was targeted at the old and established – Marks & Spencer, brands and property for example.

Over the last four years the culture has changed in London. It is critical that London's financial markets take the long view and invest in new industries and markets and dynamic businesses for the next twenty-five years. Do not be swayed by the excesses, frenzy and ephemera of the dot-com craze in 1999.

Some Key Lessons – An Empirical Process

But there are key lessons for this new environment.

Firstly economic advance is based on empiricism. Socialists and academics might not like the inefficiencies of the market, but the experience in new markets is that trial, error and experiment weed out the wrong-headed and foster those products, services or methods which are fit for purpose. No amount of theorizing can replace the disciplines of the market. In technology markets, one of the lessons of the last twenty years has been the enormous road death of new enterprises. But out of this has come the successes. A portfolio of technology stocks in 1991 will have generated great value though there would have been many failures among the major successes.

Secondly, since advance is based on empiricism, we need to re-emphasise the importance of an enterprise culture, venture capital, entrepreneurship and associated support systems. The strength of this culture in America is probably the key determinant in its

success. In Britain this culture has been growing. The setbacks of the last year must not be allowed to change the development of the enterprise culture.

It is during a period of revolutionary change that an economy needs the greatest enterprise and encouragement of empiricism in the market. Indeed what we refer to as the Silicon Valley Model might be a particularly advanced and sophisticated form of that enterprise culture. In the valley there is a recipe for enterprise: large amounts of venture capital skillfully deployed; experienced technology and marketing managers; lawyers; and entrepreneurs. The environment is like a Darwinian soup of resource, which rapidly places enterprise resource in new ideas, kills those that do not work and reallocates the resources of innovation to the new.

And finally to return to the beginning of this lecture, we now have mounting evidence of what Robert Solow sought – productivity gains throughout the American economy driven by the digital revolution. The effect on the macro-economic figures is now well documented in America, and I am sure we will see these figures appearing in European growth rates.

As in 1901, we might have seen an overheated financial market, but the effect of the New Economy is everywhere and *it* will be revolutionary.