

Power Structure Changes in the New Millennium

Power structures today are manifold and complex. Technology developments, for example, the Internet, will make tomorrow's world more complex still. This article explores just a few of the many future issues surrounding changes in power, the organisations that hold it and the ways in which it could be gained and manipulated.

Summary

Today, there is an increasing number of global institutions and companies, with much speculation that mega-corporations of the future could have more power than national governments. But the technology over the next few years not only moves the goal posts but changes the whole nature of the game. We can be certain that future socio-economic structure will be even more complex than today's.

For instance, it is very clear that the rapid growth of the Internet will soon enable very large network-based communities. Some will be communities of shared cultural identity, religion, political persuasion, business ethics, social values and so on. Many will be small and of little consequence but some will have huge memberships and consequently huge economic and political power. Bearing in mind that almost instantaneous communication is possible with the whole membership of a community, such a possibility should be taken seriously. People may belong to any number of such communities, in their respective roles. These network communities could thus be more significant than geographic communities. In business, we will see high growth of virtual companies, which can be completely global and very dynamic. These will link people and computers together regardless of location, and make money from all over the world. They will introduce new problems of taxation collection, especially since some will have no human employees at all. There will be pressure to introduce global taxation of some form. Since these companies will be increasingly decoupled from geographic bases, there will also need to be an increase in global regulation for such companies.

By contrast, information technology is likely to lead to stronger local geographic communities. As part of Internet spread,

community networks are springing up everywhere, allowing people to participate more easily and fully in their local community. Equally importantly, as technology gradually automates much of the mechanistic and even intellectual side of human work, so it can be expected that people will refocus on the human side, and community activity will grow in importance. People may begin to take their sense of identity from their place and relationships in the community, rather than their job. In such a world, the network is a tool to enhance local community life, and brings decision-making capability to the most local level. Identity may become more tribal again. Another technology push in this direction is the rise of the local telework centre. As business becomes more virtual and often more global, people may have to change jobs frequently. They will not wish to move house frequently, so there is a strong need to telework. It is clear that most people do not want to work from home all the time as they need the social contact that comes with going to the office, and would get cabin fever if they are permanently stuck at home. Local offices filled with hot desks, equipped with future teleworking technology will act as local telework centres. People need walk a short distance to work, reducing pollution and congestion on roads. Also, they will be working with people who come from the same local area, again building the strength of the local community.

So there are two parallel trends. One is to a stronger local community, able to make and manage local decisions and involving the whole community. The other is to increased globalisation and to non-geographic communities and businesses. So it is possible to envisage a world with strong global regulation that determines the rules for companies regardless of where they are based and operate, with a common global standard. This may also ensure common human rights, legal systems etc. This would ensure that people everywhere operate on the same basic rules. However, decisions that affect only local communities could be made locally much more efficiently and effectively. With a global regulatory environment and micro-local government, there could be little left to do for regional or

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national-level institutions. We may see a strong polarisation of power.

But it will never be simple. Geographic and network-based structures will also interact, corporately and socially, giving a multi-dimensional tribalism where people belong to many, often orthogonal but sometimes competing communities. Today's world is complex, but 'we ain't seen nothing yet'.

Cyberspace—The New Domain

In the beginning there was the physical universe. When intelligent beings came into existence, a new domain was created, which we call *mental space*. There is some interaction between mental space and physical space. You have a simplified model of the physical world in your head, that allows you to find your way home, or to the restaurant, and the objects around you trigger mental activities. But much of the stuff in your head is not directly related to the physical world, being concerned instead with mental activities—culture, knowledge etc. Sometimes, we construct new physical objects to facilitate our mental activities, such as libraries, filing cabinets and so on. This interaction between the new domains is of critical importance, for it is here that a great deal of money is made (and lost). People pay for 'ownership' of physical objects, and to make changes in the physical world (building houses, for example). Processes that just occur in a person's own mind without having some interaction outside do not incur any direct financial cost or reward. And similarly, physical processes generally only incur cost or value when associated with human intellectual processes.

But now we have a new domain—cyberspace (Figure 1). Cyberspace is the notional space where electronic (or optical)

The Internet is not cyberspace, but it is part of the matrix on which cyberspace is built.

activities take place. It is the machine world's mental space. It is a separate domain that interacts with the other domains. Many programs are running in cyberspace. People create new cyberspace activities and objects by interacting with their machines. Physical objects such as video cameras give rise to new cyberspace areas and data too. Today, almost all of cyberspace that exists has come about through one of these two processes, but in the future, an increasing amount will be created from within, by evolution techniques that do not involve people in their production of new programs. The reverse interaction is interesting too. Most of the impact of the Internet results from cyberspace providing a bypass to the physical world, side-stepping geographic constraints. The Internet is not cyberspace, but it is part of the matrix on which cyberspace is built.

Functional Decomposition and Recomposition

In enabling a bypass for physical-space-based systems and processes, the Internet encourages the complete decomposition and reassembly of physical world systems (Figure 2)—all of them. It forces us to re-address every problem afresh. Each customer need that can be satisfied by a physical-space-based process might be more

efficiently or effectively addressed by cyberspace.

The whole of business and commerce is being thought out from scratch by new entrepreneurs. Some are unconstrained by any assumption that industrial age processes must somehow be the best. Commercial experience in the industrial age can be a negative asset in the information age. Indeed, we might consider that a company's fitness for the information age environment is dictated by the following equation:

$$\text{Fitness} = \frac{\text{flexibility} \times \text{speed} \times \text{vision}}{\text{experience}}$$

But while cyberspace bypasses the physical world in terms of information processes, it has less direct impact on physical processes. We must look at each company and institution, and separate out the information from the physical components before we start our reconstruction. The knowledge, logistics, expertise, databases, management and so on belong to the information world, and we will have to reconstruct these. Physical things such as manufacturing equipment, materials transportation and even networks are physical. These parts of the system are only indirectly affected. They will change certainly, but much less than the information world. Changes will be mainly in taking advantage of more easily available information, and trends such as customisation, using better communications with the customer. Mostly, we will still need big efficient manufacturing plants. We will certainly still need mines. Their management may become just-in-time or whatever fad is popular in the future, but diggers will still take materials out of the ground and ship them to manufacturers, who will still convert them

Figure 1 Power domains

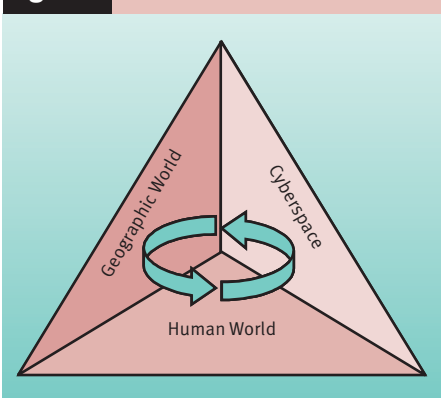


Figure 2 Functional recomposition

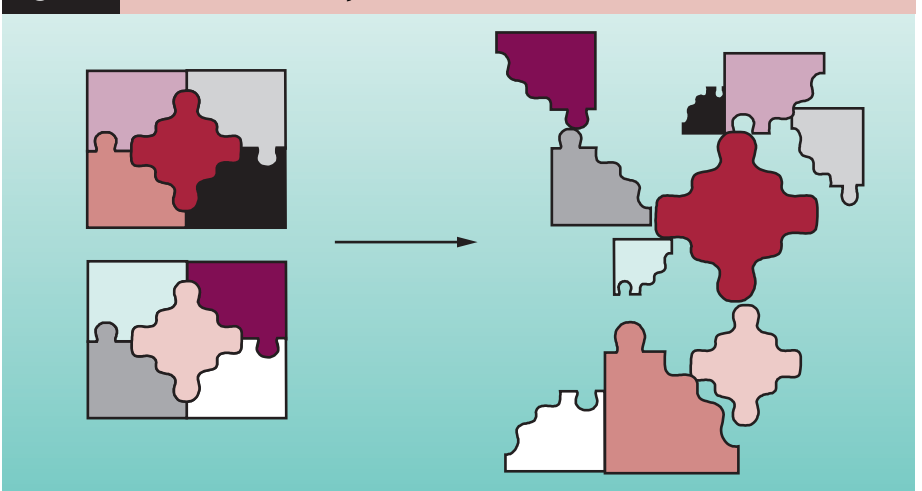
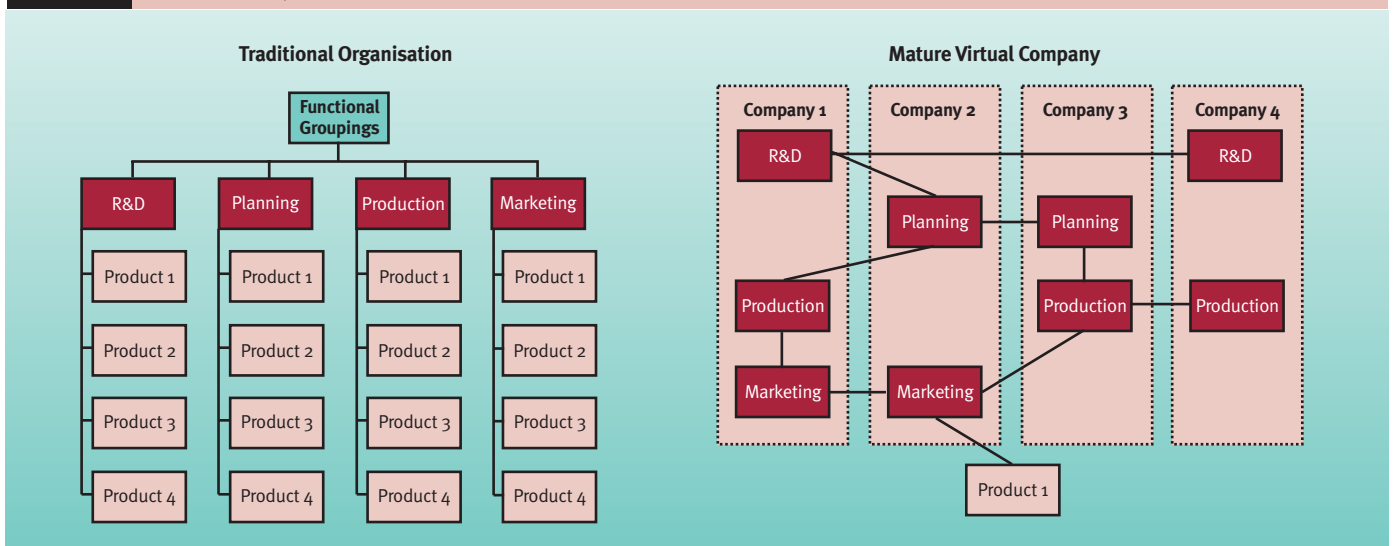


Figure 3 Virtual companies



into physical goods. Generally, the further down the value chain, the more likely the company is to survive the change.

Raw-materials providers and manufacturers will be less affected than companies further up the value chain. In more specific terms, General Motors is more likely to survive intact than Microsoft.

Virtual Companies

While traditional companies have a full-time work force and keep their products in-house for the full product cycle, from conception to after-sales support, virtual companies are much more loosely coupled. People can be brought together for a single project or part of a project cycle and then disbanded (Figure 3).

Cyberspace allows virtual companies to be formed using people and information resources from anywhere in the world, and provides the communications spaces for these people to work together as a team as closely as if they inhabited the same office. In fact, because of the potential for automation and transparency in cyberspace, many aspects of working together are enhanced. For example, translation, automatic transaction logging and message recording can enable better control than an ordinary office where people simply chat to each other and use paper notes.

So virtual companies can be truly global (Figure 4), and can in principle be comprised of the best people available worldwide for the task in hand. Companies are not stuck with the same staff all the time regardless of their expertise suitability. They can therefore compete well with traditional companies, and we are seeing much use of this technology already. Collaboration between companies is another form of the same.

Virtual Cooperatives

However, virtual companies will not have it all their own way. It might seem that in such a world, the companies hold the power and the poor workers have to sit and wait for contracts to come in. Far from it. Software already exists to configure virtual companies almost automatically. We can also expect that, as e-commerce matures, the business market will be pretty well mapped out electronically and it will be possible to automatically identify market needs, such as where there is a deficiency in local distribution or whatever. Linking these technologies and machine-based knowledge together, it will therefore be possible in due course for virtual cooperatives to be set up automatically by the e-commerce infrastructure. The virtual co-ops will link freelancers together to make virtual companies. Virtual co-ops

will be bottom up, automating the higher levels of administration and management. Virtual companies will be top down, keeping a few key employees and bringing in contractors on a project-by-project basis. These two kinds of organisation will compete head on. In the manufacturing industry, we can expect that having the means of production, the factory, will be the most significant factor in deciding dominance. In the information-dominated world though, the major means of production is often the intelligence and knowledge in the people's heads coupled to cheap information technology. Physical resources may be needed but are less significant in determining dominance. The virtual co-op would therefore seem to have the advantage here. Freelancers keep the whole of the value from their work, instead of the company taking a large proportion.

Figure 4 Global virtual companies

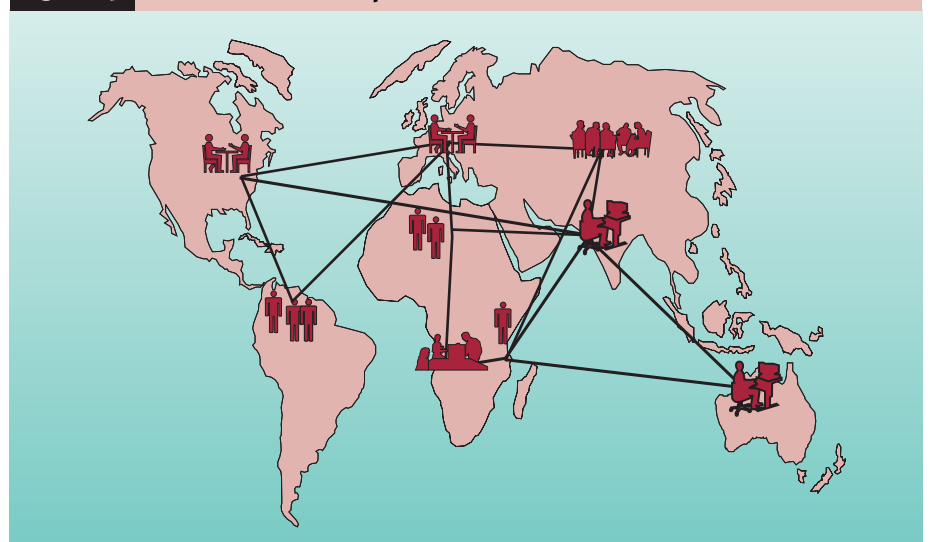
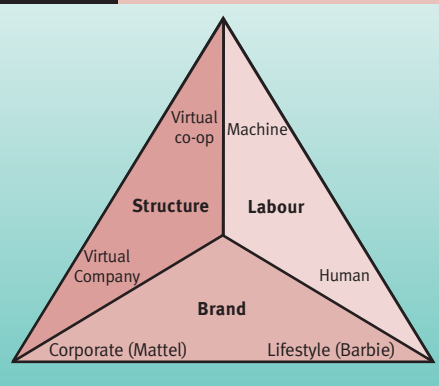


Figure 5 Polarisation in business



The Knowledge Guilds

This does not just apply to the small company either. While some large information companies will undoubtedly exist, they can just as easily be formed by automated alliances—guilds comprised of many smaller virtual co-ops. These knowledge guilds may be the dominant power structures of the information world and could yet be automatic. They may coordinate and market the skills and knowledge of millions without any need for shareholders or managers.

Brands

As our lives become increasingly dominated by the impact of the Internet, we will see a parallel increasing globalisation of markets. This trend is already obvious but will accelerate. We will be faced with much more choice when we want something. Choice is a good thing, but stressful. We do not actually individually want choice—we would probably prefer to be faced with just one product, ideally suited to our personal tastes. However, we do not want everyone else to have the same thing as us, and we certainly do not always want the same as everyone else. We also are stressed because of uncertainty of product quality or image. Brands resolve this issue today and will be increasingly important in the Internet world. When faced with 200 offerings in the same price band, we need brands to tell us which one to buy. But brands can be both vertical and horizontal. We may choose a particular manufacturer that we perceive of as good value or high quality. But we might also choose on account of lifestyle, and this can cover much more than one manufacturer. Many people choose whatever product *Which?* magazine recommends. *Which?* is simply a quality guarantor, but it de-stresses the whole process of choosing for many people.

Barbie is a superb example of a particular product from one manufacturer that symbolises a lifestyle so well that the Barbie badge is now used to sell everything from baked beans to bicycles. There is little a five-year old girl wants that cannot be found with a Barbie badge on it. In the adult world, many people pick Virgin for the same reasons. Designer labels similarly cut across a wide spectrum of goods from different manufacturers. When these interests collide with manufacturers' interests to push their own names and brands, it is often the lifestyle brands that win.

So while brands will probably grow in importance in the Internet world, we will see increasing competition between lifestyle brands and single manufacturer brands. In the rush to capitalise on the stress reduction market, we may well see even more products with multiple badges on them, symbolising conformance to a spectrum of lifestyles. Today's vegetarian and healthy-eating badges are just the start of this.

Remuneration

Before leaving the field of business power structures, it is worth addressing change in forms of payment. Most payment in today's developed economies is in cash. An increasing number of barter economies are springing up in the UK—*local exchange trading systems* (LETS). There are now hundreds of LETS. They echo the common inclination of people to prefer reward in non-cash forms for work in their local community. Babysitting circles have survived on informal systems such as these for many years. Barter systems do not have to be local though and it is just as feasible to implement such systems on the Internet for people exchanging information work. Although there is little formality in this today, many people already exchange information on a friendly basis, assuming some reciprocation. Extending LETS principles to the Internet may enable slightly more formality in this system.

But, most importantly, many people have always worked for free, expecting no reciprocation of any kind except the knowledge that they have helped someone or contributed to their society in some way. Although such free labour can of course be entirely altruistic, many such contributors receive some feeling of satisfaction, pride, or well-being (Figure 6). It is possible that as the economy becomes increasingly automated and people become less important in the production of material goods, that this type of reward may become more commonplace. Many people may have their sense of identity and self worth from seeing the

fruits of the work they do in their community instead of through a conventional job with financial reward. So it is clear that even in terms of rewarding people, power is split and cash's virtual monopoly is reducing. Taxation systems are starting to get to grips with LETS, but well being is not so easily assessed. Perhaps we will simply see a general trend towards higher quality of life based less on financial well being and more on mental and social well being.

Taxation

But tax is a source of other problems too. Business is becoming increasingly global. Also, many companies will make their money just by processing information. Many of these companies will be no more than software. As artificial intelligence gradually takes over information processing work, it becomes possible to decouple the work from geographical locations. The algorithms that create or add to the value can run on any processor anywhere, and could change their physical location every few seconds if need be. At the end of the year, if they have not spent any time anywhere, where would they pay corporation tax? And where should the VAT on their produce be paid if it is used by other information providers? Or used as payment in kind to information workers? As our incomes increase, we could expect to spend a higher proportion on information products such as entertainment, education, and information services. If we were paid these direct as part of our remuneration, it would make taxing income much more difficult.

The problems arise partly from the non-geographic nature of future commerce, and partly because of its non-physical nature. The non-geographic problem could in principle be addressed by a global taxation. It seems unlikely that we would get any agreement on how such tax should be distributed, but not impossible. In that case, every company everywhere that does not pay tax to a geographic domain would pay into a global pot. There may be competition for the rights to manage such a system, between the World Trade Organisation, United Nations etc, or, since this is just one

Figure 6 Forms of payment

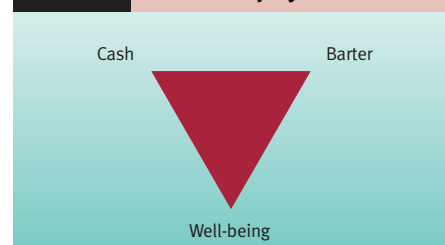
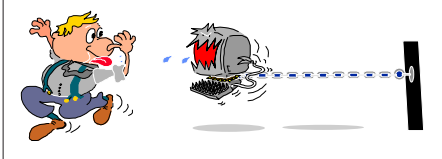


Figure 7



Governments can regulate fiercely within their own domains but will have no authority to collect tax from elsewhere

of many problems hinting at the need for a world government, maybe even that is not impossible to imagine in due course.

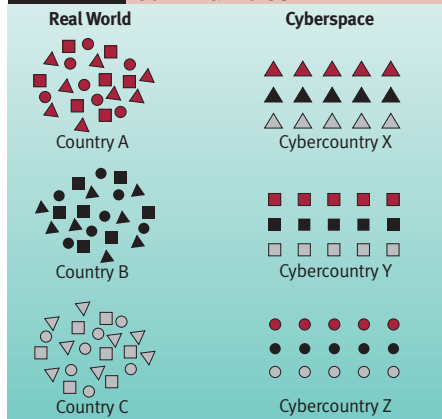
But the fact that information can be transferred easily between locations, but cannot easily be tracked, decoded, or the source identified is a bigger problem. The notion of bit taxes, taxing on volume of transmission, has often been raised but so far successfully dismissed. It may resurface many more times and might even be implemented, but it is illogical and cannot be made fair unless privacy is sacrificed. One problem is that in some sectors, the entire annual information output of a billion dollar corporation might take no more bits to express than a few seconds of amateur web-cam footage or a couple of holiday snaps.

Network Communities

It is very clear that the rapid growth of the Internet will soon enable very large network-based communities (Figure 8). Some will be communities of shared cultural identity, religion, political persuasion, business ethics, social values and so on. Many will be small and of little consequence but some will have huge memberships and consequently huge economic and political power. Bearing in mind that almost instantaneous communication is possible with the whole membership of a community, such a possibility should be taken seriously. People may belong to any number of such communities, in their respective roles. These network communities could thus be more significant than geographic communities.

For example, suppose that a decade from now, hundreds of millions of individuals are on the Internet that have at some point supported an environmental campaign. Groups of this size would be irresistible to politically-minded people. The skills needed to manipulate large groups on the net may well be very different from those suited to TV or the soap box, but whatever skills are needed, some people will have them and use them to advantage. We might

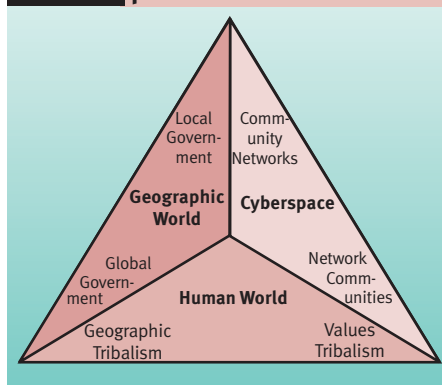
Figure 8 Network-based communities



see the vast combined economic power of hundreds of millions of people used to wield sanctions against countries that unduly damage the environment, forcing them to change their ways. There can be no defence or retaliation against such sanctions since the members would be geographically distributed around the whole world. Or we could similarly see a couple of billion women, their boyfriends and husbands refusing to buy products from a company until they introduce equal opportunities for women. The choice would be simple—comply or go out of business. These notional values-based communities exist today. What is new is the ability to communicate with and coordinate the global group almost instantaneously.

These network communities may be formed around any kind of value set—environmentalism, feminism, business ethics, lifestyle, religious beliefs, and, of course, racial hatreds and conflicts will be echoed in cybercommunities too. Each and every component of our lifestyle or sense of identity may be echoed in some pressure group or other on the net.

Figure 9 Social power structures polarisation



Local Community Networks

Non-geographic cybercommunities will not be the only communities using the net. Local geographic communities are already building community networks based on the Internet. Today, these already link together local clubs and societies, and provide access to local culture and education across the net. In due course, they will also be used to market local intellectual resources such as museums and galleries. People can have much more involvement with their local community activities if they do not have to set aside a whole evening and find babysitters to attend a meeting. They can also be more involved in local decision making. Community networks are therefore a valuable aid to local democracy.

In fact, as local decision making becomes increasingly feasible, we may well see many functions of today's national government migrate to local authorities (Figure 10).

This trend toward community networks will strengthen local communities, and will happen at the same time as local telework centres become commonplace. These too will service to strengthen local community by helping people to get to know other people from their local areas.

Tribalism is often based on an ideology or race, but is often based on geographic location. People in Ipswich tend not to support Norwich football team. Tribalism can obviously be geographic or non-geographic.

Consequently, we will see strong local geographic community developing in the same time frame as strong cyber-communities. People will easily be able to balance this loyalty. They already have many affiliations so, while this will be novel in some ways, in others it is just an extension of the multiple roles that we all have today.

Cities

Today's main physical power structures are cities. These do not have a single function, but bring together every type of social and

Figure 10 Political restructuring

Best organised locally	Best organised globally
Construction Planning	Rules of Engagement
Social Facilities	Basic Rights
Geographic Institutions	Taxation
Clubs	Industry Regulation
LETS	Standards
IP Marketing	Censorship
Local Culture	Cash
	Environment
Little or no role for national or regional institutions	

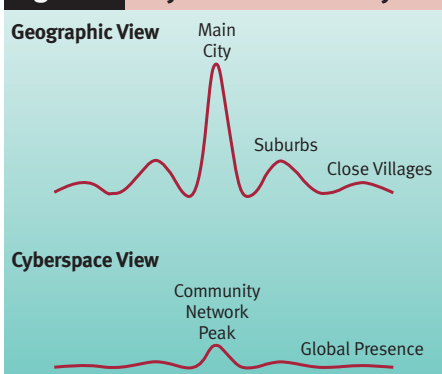
business activity. In the geographic world before the advent of the train, a city had little influence outside the nearby villages. However, with today's easy communications, some big cities have an influence all around the globe. In cyberspace, this influence can be even more easily spread so that some cities will have a very strong global presence (Figure 11). This could be based on culture, image, aspirational lifestyles, business influence, politics and many other factors.

Of course, cities house many cultural and commercial activities. Many of these will be accessible on the net in the future, so there will be much more competition between cities. If the cultural activity in your own city is not good enough, you will be able to attend a wide variety of events elsewhere via the net. The front door will not be locked, but when you have access to the best in the world from your living room, the nearby city will have to compete a little harder and offer more. If the local quality is good enough, it will bring in rich rewards from people all over the world as well as attracting the locals into town.

Globalisation

The trends discussed so far have already hinted at polarisation of power structures. The main remaining polarisation is local versus global. Some political power will migrate towards local communities, but some is migrating quickly towards global decision making. Issues such as taxation have already been addressed. But many other things will be addressed globally too. Telecommunications standards already are, and increasingly anything to do with business will be decided globally. As business becomes more global, so its regulation has to be too. Even standards of behaviour for governments are being addressed by the whole international community. Human rights abuses and ethnic cleansing still happen, but increas-

Figure 11 City influence density



ingly under a global spotlight, with ever-more pressure brought to bear on those violating what is considered globally to be an acceptable standard.

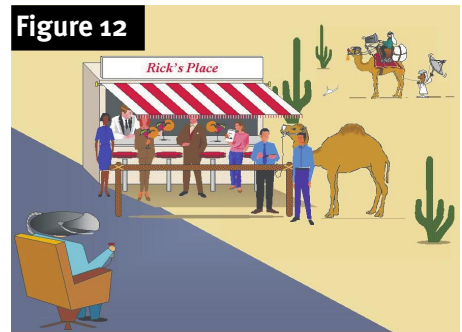
There are, of course, various global bodies such as the United Nations, World Trade Organisation, World Health Organisation, etc. We may either see more such organisations regulating individual components of global interaction, or alternatively a strengthening of these existing organisations and an increase in their scope.

What is conspicuously missing today is the ability of people to directly take part in decision making outside their own country. Network communities will capitalise on this vacuum informally, but there may soon be global voting on some issues. If we are not to be held to ransom by every global pressure group, we will need some way of balancing this by representing the views of the whole people. Also, it is already obvious that some issues simply do not make sense for individual countries to decide. As a UK citizen, I have no direct influence over US government environmental policy, although it affects the quality of the air I breathe, the water I drink and the food I eat. In the future, I would expect that, as IT makes it more technologically feasible, there will be more pressure on governments to allow the views of other external communities to have a say, albeit, presumably, a lesser one than their own citizens. I believe this will be much more direct than today's solutions of our own political representatives asking nicely via an ambassador or at the occasional global conference.

Power Tools

To some extent, that nature of power depends on the medium. Some people are ideally suited to direct interaction, others to the TV or newspaper. On the net, there are several new platforms to be exploited. Chat rooms, conferences and web broadcast media are already widespread but the technology is still in its infancy. Very soon, all of these can be greatly enhanced by allowing participants to meet in virtual environments (Figure 12). These can be fully immersive and some will be very attractive places to be. The best will attract vast numbers of people, so will attract those who wish to influence those people.

These virtual environments may have at best a loose mapping on the physical world. Someone who is old and ugly in reality could appear young and attractive in cyberspace. Men can pass themselves off as women, computer programs can pass themselves off as people. An entire community of interests may be realised as a single



Use of virtual environments

personality, or vice versa. There may be little certainty of who or what you are talking to. A few environments may insist on strictly accurate representations, backed up by ID checks and authenticated photos, but most will not, and people may prefer the fun of never knowing for certain. We will have to cope with impostors who will try to alter our image of important people by taking their image and saying or doing things that would damage their reputation. Even when we know for certain that it is the person we think it is, their image could be altered digitally, perhaps subtly tweaking the body language so that they appear dishonest.

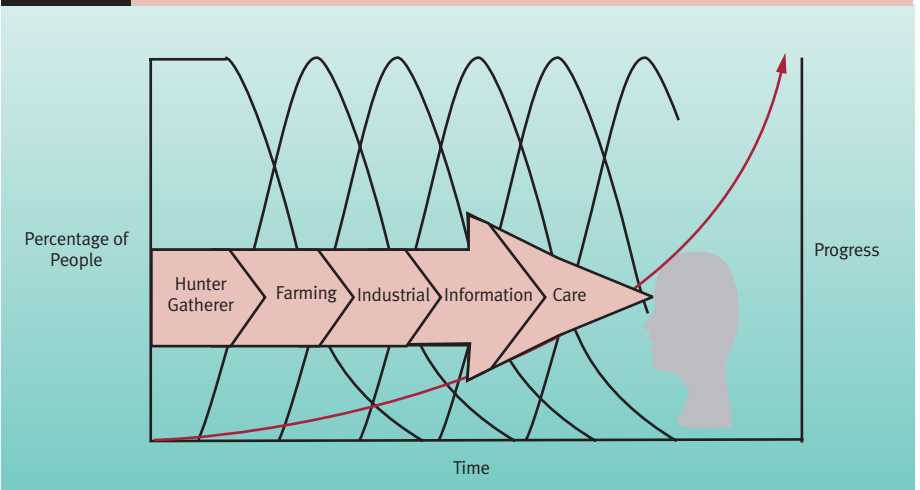
These environments are a new platform for advertising for people, companies and products. But they are also ideal for spreading lifestyles and political viewpoints. You may visit Stonehenge today and learn various theories about how it was used and what it used to look like. In 10 years, we may have a virtual version with all the stones in their original state and proper position, with authentic looking druids dancing around the stones (Figure 13). If the atmosphere is just right, taking part in such a ceremony might seem very exciting, and lots more people may become more interested in druid beliefs and lifestyles.

Many minority interests may use compelling virtual environments to attract followers. Other mainstream views might

Use of virtual environments for proselytisation of cults



Figure 14 Long-term evolution of socio-economic power



be subtly represented in other virtual environments, in the general flavour of things. Warfare in the developed world is already becoming much softer, and in cyberspace we will often not realise the attitudes we are gradually absorbing. 'Neighbours' has done more for the British view of Australians in a shorter time than any amount of military invasion forces ever could. Cyberspace offers infinitely more potential.

But, of course, not all communication will be in virtual environments. Cyberspace will also offer the potential for language translation, cultural translation and even intelligence disguising. A CV or an e-mail sent by a dumb person can be automatically reworded with better grammar and presentation, using language indicative of a higher intellectual capacity. Or conversely, scientists and engineers may achieve greater influence by appearing to speak in plain English. For a time, at least, use of such tools will confer an advantage.

But the greatest of power tools is the access to knowledge. Instead of taking a doctor's opinion as automatically correct, people now have access to the latest expert opinion on every disease and treatment via the net. The balance of power has already changed irrevocably, and many doctors do not like it. Every other profession will soon feel the same effect.

In fact, artificial intelligence will gradually erode the influence of the professions anyway. Not all of a doctor's or lawyer's skills can be embedded in today's expert systems or neural network technologies, but, as the whole field of artificial intelligence evolves, it is becoming apparent that the human expert can expect to be an increasingly less dominant part of a man-machine team. Within 20 years, almost any intellectual task will be achievable cheaper, faster and better by means of artificial intelligence.

So, in the same way as the JCB has superseded human physical strength, the computer will surpass and substitute for human intellect. The economic value of being smart will be reduced. The smart machine will be a great equaliser.

The Care Economy

Industrialisation made physical labour a great deal more efficient by changing its organisation, and centralising work so that machines could assist (mills etc). Later advances in machinery, through both engineering design and power, displaced many more humans from physical jobs while greatly increasing overall production. Future advances in robotics will see another wave of automation in physical

jobs, replacing people outright in some while increasing productivity in others and de-skilling still more.

However, the most significant wave of automation that we are witnessing is the automation of mental work. Software has already made it easy for managers to do their own administration—much of what clerical and secretarial staff used to do is now completely automated, so the automation of simple mental jobs is already well under way. Artificial intelligence promises to take over tasks much further up the value chain, eventually replacing large numbers of managerial and professional jobs while de-skilling many others. We will again see production and consequential standard of living increase dramatically while the numbers of people we need in these roles will decrease enormously. Productivity will increase enormously so we will have much greater wealth, but we will not be needed in quantity to operate the productive side of the economy. Money is a convenient way of sorting out how people exchange their time. Whatever it is that people do, that is what we pay for. If we are not doing physical or mental jobs, the remainder will be the basis of the care economy. We will value the human as a human, not as a cog in a machine. It will be the human skills, the interpersonal, caring skills that we pay for. For everything else we will use a machine. So eventually, the information economy will draw to a close

and be replaced by the care economy (Figure 14). This will begin in earnest between 2015 and 2020 as artificial intelligence broadly approaches human levels of intelligence.

Many people will be made redundant by these smart machines, whether robot or computer or both. Most will not sit idle, and many new roles will be invented to fill their time. There were no web-site designers in 1990, and few virtual environment designers today. Many new jobs will centre on human contact, interpersonal interaction, caring, serving and entertaining. Hence the title *care economy*. These roles cannot be automated in the same way as physical work or information processing. Only humans are humans. Synthetic humans—androids—will eventually exist and they will start the wave of automation yet again, but that is in the far future, beyond the reach of this article.

So the human has an edge for the time being in terms of value add. It is interesting that jobs such as nursing are currently becoming more highly skilled with reducing emphasis on actual caring, the traditional nursing role. As smart machines permeate health care, we will see many doctors' roles de-skilled so that nurses can cope with them, increasing doctor productivity, and then later we will see nurses once again concentrate on dispensing care as the intellectual side of their job becomes increasingly trivial. Widespread use of

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artificial intelligence and robotics is in fact the only way our increasing demands for improved health have any chance of being met.

And Ultimately?

The long-term future of this trend makes for thrilling sci-fi and speculation, from The Forbin Project and Demon Seed to Terminator 2 (the prototype of the liquid metal technology in the T1000 has already been built by Robodyne). Will smart machines be valuable tools or wipe us out, or treat us as pets, or slaves? Or will they forever be devoid of self awareness and intention, always 'just' machines? These questions are being debated fiercely today.

But even here there is the potential for increasingly intuitive links between our minds and the computer, so that they may never gain a significant advantage. Eventually nanotechnology might allow a direct connection, without any need for a DIN socket. We may get smarter effectively by linking to machines. The ultimate power struggle may be within humanity, as some go for upgrades while others fight for traditional Mk 1 humanity. *Homo machinus* may eventually make *Homo sapiens* voluntarily extinct when they finally win the lifestyle war.

Biography

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Ian Pearson graduated in 1981 in Applied Mathematics and Theoretical Physics from Queens University, Belfast. He spent four years in Shorts Missile Systems, in many different disciplines from mechanical engineering to battlefield strategy simulation. He joined BT Laboratories in 1985, analysing the performance of computer networks and protocols (especially OSI). After two years he moved to the Local Access Division where he helped develop ATM transmission over optical networks and invented addressed time slicing. In 1990 he moved to the Network Studies Unit, where he worked on evolution of broadband networks and services (and invented the active contact Lens and 3D Wand computer interfaces). From 1992, he has worked in the Advanced Research Department, in the Cybernetics, Networks and Mobile Systems groups. He now concentrates on mapping the progress of new developments throughout information technology, considering both technological and social implications. Ian currently works as BT's futurologist in C2G, BT's new Communications Consultancy Group.

He received the Best Paper award at the 1993 FITCE Conference for his first externally published paper and has since received six other awards for published papers, including the IEEE Benefactors Premium in 1994 and the IBTE Journal Best Paper Award in 1996.

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