

Technology and Transport in the Enterprise of the Future

A talk in Delhi, January 2nd 2012

by Ian O. Angell, London School of Economics

Welcome to the future. Everywhere institutions like work, the workplace, money, the marketplace, the firm, and even capitalism itself, are mutating. Competitive liberalization of that marketplace, along with e-commerce, have brought about the collapse of barriers to entry, and the blurring of business sectors. Access to comparative information has empowered the smart consumer. ICT has brought with it the death of distance; time-scales have been condensed, all driving down costs to a point where legacy systems, which were once an advantage, are now expensive overheads ... liabilities even.

Then add rapid and effective transportation of both people and goods into the equation, and we have the unstoppable force of Globalization. Companies must change if they are to survive and prosper in this Brave New World. Therefore it is essential that we all consider just what the company of the future will look like.

Let me start by asking, 'why do firms exist at all?' Nobel prize-winner Ronald Coase told us over seventy years ago. Why do entrepreneurs and workers group together in a firm, rather than buy and sell each other's services on the open market? The deciding factor, he said, is transaction costs: the costs incurred in the development of commercial contracts. Each firm is formed when it is cheaper to organize as a group, rather than buy and sell contracts in the marketplace. But, and it is a big but, the firm will stop growing when those goods and services can be bought more cheaply in the marketplace.

This idea is dynamite for the Information Age. It explains much of the turmoil we feel today. 'Spot markets' and B2B alliances are forming via cyberspace. Every firm is seriously considering outsourcing in their drive to achieve value for money. The Internet, advanced manufacturing technologies, when linked with efficient and effective international travel and transport, has fundamentally changed the nature of transactions, and hence their costs. Just as railways were inextricably linked to the Industrial Age, so air travel is essential to the Information Age.

Tomorrow's company will have to produce completely new products for empowered customers, requiring a complete rethink of their operational procedures, strategies and business models, if they hope to survive and prosper in radically different operating environments. The structure of yesterday's firm was an answer to the question: 'what is a viable firm?' against the judgements of the transaction costs from the Industrial Age.

Today, the answer to this same question is delivering a radically different animal. The dominant hierarchical and bureaucratic firm has passed its sell-by date. This juggernaut of the factory metaphor, that won yesterday's battles of natural selection, is being totally outmanoeuvred by the different organizational forms that are emerging. Global companies are setting themselves up within 'virtual enterprises', at the hub of loosely knit alliances of companies – joint ventures linked together by global networks: electronic, transport and particularly human. They assemble to take advantage of a temporary business opportunity anywhere on the globe; and then separate, each component firm moving on to its next major deal. The virtual enterprise is project-based, and developed around complex information systems: the information system IS the virtual enterprise; there is nothing else. It IS the headquarters; and it can be based virtually anywhere – anywhere, that is, where the quality and the transportation of goods and supplies is guaranteed, and provided the procedures are secure.

Welcome to tomorrow's world, a world as different from today, as today is from the pre-industrial age. Using the networked portable computer, the ubiquitous mobile phone, good road communication, and walk-on walk-off air travel, firms are turning office workers into 'teleworkers', and getting 30% more productive work out of them. Yesterday's office workers sat next to a unique telephone number and a filing cabinet stuffed with paper. Now they are 'road warriors', taking their phone numbers and files with them, anywhere that transport systems will take them.

The office of the future will be a 'virtual office'. Charles Handy predicts it will be structured like a club, where most of the space is allocated for employees to socialize and thereby reinforce organizational bonding. The working parts of the office will be nodes in a telecommunications/transport network. Cars, airports, aeroplanes, homes are now extensions of the office. Should office space be needed for the odd meeting, it can be hired on short time scales - even for just a few hours.

On arrival the employee is given any appropriate office (the hot office). Its physical location needn't be fixed, or even owned by the company. The office is where you plug into the company information system, so it can be anywhere. Hotels, railway stations and airports are supplying temporary office space. But why pay rent at all? Why not hold meetings in the lobby of the best hotel in town, all for the price of afternoon tea? If you are really mean, there's always Starbucks!

The office won't have a person's name on the door, but a project's. Inside, hot desks are shared between project-team members. By time-sharing desks, it is common for five people to share each hot desk; one IBM office in Finland boasts twelve people per desk. The all-knowing company (just-in-timeshare) information system will establish the exact location of each and every employee, and messages for them will be delivered directly, just-in-time, no matter where they are in the building, no matter where they are in the world.

Companies now think globally, because they can communicate globally and because the shareholders, the executive, and the employees are spread out across the globe! Companies that nurture such networks will successfully integrate themselves into the global economy, indifferent to, and unhindered by, national boundaries and barriers. They are transnational, and they will relocate (physically, fiscally and electronically) to where the profit is greatest and the regulation least.

The umbilical cords have been cut; the global company no longer feels the need to support the national aspirations of the country of its birth. Virtual enterprises do not identify with any particular country, and they walk away from a country just as easily as they enter it. Thomas Jefferson recognized this truth over two hundred years ago: "merchants have no country. The mere spot where they stand on does not constitute so strong an attachment as that from which they draw their gain". And now on the Internet, everyone is a merchant.

Wealth can be digitised, and move to the deregulated common grounds of space, to what Rees-Mogg calls "the greatest tax haven of them all, Bermuda in the sky with diamonds". International law and domestic law still apply to the 'Global Commons' according to the 1967 Space Treaty, but firms can choose which domestic legal order is most favourable. The virtual reality of off-planet commerce beckons.

At first glance such an illegitimate offspring of the ‘flag of convenience’ and ‘pirate radio’ looks like a silly idea. But even poor countries can get in on the action – they merely act as tax-havens and data-havens for footloose firms and individuals. There are no barriers to entry. Previous disadvantages of the Third World, like bribery, corruption, incompetence and political instability, are obstacles no longer; since, except for a brass-plate, a company has no physical presence there – business is all off-planet. The G-7 cartel can no longer use its technological superiority to keep the rich pickings for themselves. The OECD is already crying foul over the “unfair lowering” of tax rates and a “race to the bottom” that could lead to “fiscal degradation” of the tax base. Off-planet commerce will service any (information) product that can be dematerialized. A satellite acts as a depository for digital cash. You also send the digital safe that secures it - and you hold the only key.

Supported by a global transport system, firms will re-site manufacturing/service facilities, moving from high cost areas to low, or to countries with less stringent legal requirements, and more advantageous employment and tax regulations. Just abandon the old site: send in the helicopters, take what you want, wave to the strikers fuming below, and leave a frantic local authority with a useless real estate.

The apparent size of the firm can be amplified far beyond the physical reality. You are what you claim to be; you are what you can deliver via telecoms networks. This cartoon of two dogs sitting in front of a PC says it all: “On the Internet nobody knows you’re a dog”. Nobody knows, nobody cares, provided you deliver the goods. By using new technology and reliable global transport, even very small players, even individuals, can come from nowhere to become a major force in a relatively short time.

Although we should heed the words of President Pompidou - “there are three roads to ruin: gambling, women and technology. Gambling is the quickest, women the most pleasurable, but technology is the most certain.” So, will technology lead to ruin? Of course not! We may be damned if we do, but we are doubly damned if we don’t. Remember Machiavelli’s famous last words. At his deathbed a priest was delivering the Last Rites: “do you renounce the devil and all his works?” To which Machiavelli replied: “this is no time to be making enemies.”

However firms do not have that choice. They cannot simply renounce the works of this devil’s technology, and so they must come to understand the nature of the beast. A touching

faith in technology is typical of the preposterous claims made in the early days of every technology. X-rays were once considered harmless novelty, used unguarded to check on foot size in shoe shops. In its pioneering days, electricity was claimed to have a therapeutic effect. Small electric shocks were thought to cure, among other things, consumption, dysentery, cancer, blindness and worms. Consider the 'Heidelberg Belt': a chastity belt with electrodes. Apparently small electric shocks to the nether regions could increase sexual potency. Of course, we aren't that stupid. Oh no! There is no denying that the dominant ideology of our times actually promotes computerisation as a virility symbol. No expert can appear on television without the ubiquitous microcomputer peeping over his shoulder. The fact is we really DO believe that computers increase business potency. The history of human problem solving is littered with examples of the first step fallacy: "they think they are reaching for the moon, but all they've done is climb the nearest tree".

Only after the nonsense stops, can technology be used propitiously, and to its full potential. Computers deal with objective well-structured problems with amazing speed, with detail, but they cannot cope with subjective subtlety, ambiguity and complexity. Any technology must be carefully managed, and that means we must come to understand its systemic nature. To get the most out of technology we must know when to use it, and when not to use it. This is a very difficult skill to master.

The first thing to recognise is that, like everything else important in life, technology cannot be bought on the cheap. NASA astronaut Mike Collins was asked what went through his mind at 'blastoff'. His reply: "that you are at the top of 6 million parts, all made by the lowest bidder!" A good technology platform, although necessary, is not sufficient for success. For success (and failure!) will be determined by unique social, political, organisational, and particularly personal factors, not just the functional.

The real strategic difference for a firm is the added value that comes with understanding of why we use technology, and of the way that technology affects various activity systems. "Why do we use technology at all?" Technology structures our actions, and thereby transforms Uncertainty into Risk - a heady mix of hazard and opportunity. We swap hopelessness, for the optimism in a plan of action. In other words we impose structure in order to gain a tenuous handle on uncertainty.

Today I want to show you that the prevalent so-called ‘scientific’ notion of risk is flawed. We are NOT managing risk, but uncertainty. Risk is something we produce to help us deal with uncertainty. We project patterns onto uncertainty, thereby sampling it, and get back what we perceive as Risk.

Risk is an output, not some ‘thing’ there to be captured. Many ‘so-called’ risk managers simply don’t understand this. Think of Lehmann Brothers, or Northern Rock, or the Icelandic Banks! Imagine – Enron ran a “management of risk” consultancy! Risk depends on the structures we impose on uncertainty. Different structures ... different risks. Unfortunately the structures we introduce to produce risk, themselves introduce new uncertainties.

“Though this be madness yet there is method in it.” The more confident you are in your methods for dealing with uncertainty, the more likely hubris will strike. I was once at a commercial conference: Managing Uncertainty. I shared the stage with a statistician. He droned on about Risk being all about distributions and expectations. The business audience too found it inspiring stuff! Within five minutes eyes began to glaze over. After ten he was talking to an audience of one: me. I was on the stage, I had to listen to the rubbish. But then, what did I expect? A statistician is someone who wants to work with numbers but doesn’t have the personality to be an accountant. Using statistics to manage the future is like driving a car while looking in the rear view mirror.

Then it was my turn. I walked over to the podium, and just stood there, ... and stood there, ... and stood there. For a whole minute I just stood there. I fidgeted, and shot frantic and terrified glances at the audience. At first there was silence, then a few murmurs, then a growing rumble of concern. The chairman rose to help me. He was half way across the stage when I banged my fist on the table and said: “now that’s uncertainty, it has nothing to do with statistics.”

Different ages have different perceptions of uncertainty; thus different organizational and technological structures; each delivering different risk assessments. We have just entered a different age, where the very nature of uncertainty, and hence of risk, has changed. Many ‘so-called’ risk managers haven’t understood this. It’s sobering to realise that Enron ran a ‘management of risk’ consultancy. However, get the balance with technology right and you will be repaid handsomely. Get it wrong and you will waste even more billions of dollars.

You must recognize the obvious secret of the e-economy: e-business is just business. We have left the contagion stage of the Internet life cycle: the Net can only make commercial sense when it is integrated as just another channel, albeit a very important one, into the administration of a mature business model of new organizational forms. We must look far beyond the functionality of digital technology, beyond the good intentions of the designers, toward the observable consequential risks when digital technology is integrated into business in particular, and society in general.

Any technology, even seemingly benign, can bite. Consider the devoted fan of Ella Fitzgerald. His last wish before he died was for Ella's version of "Every time we say goodbye" to be played at his cremation. The record was placed on the turntable, the stylus poised over the fourth track - but the wrong side had been chosen. What tune do you think accompanied the casket into the incinerator! With computer systems, you too can get burned.

Systems misbehave! Grand schemes may solve the problem as intended, only to create worse problems. So why should digital systems be any less perverse? When you use the tools of any technology to solve a particular problem, you may or may not succeed, but what is certain is that completely unexpected phenomena will happen. The implications of each layer of technology feeds back into the surrounding human activity systems in the form of new questions about the appropriateness of solutions, and of new problems. The original clear demarcation of a technological application can easily collapse in a confusion of multiple overlapping systems. Complexity increases to a point where utility turns into reliance, reliance becomes dependence, and the *Law of Diminishing Returns* precipitates a galloping descent into nightmare. Welcome to the Twilight Zone, and the Management of Information Systems!

When digital information systems are mixed with human activity systems – two fundamentally different types of system – they inevitably throw up systemic risks: unforeseen consequences, both hazards and opportunities, which are the result of feedback in the inevitable complexity of interactions. Mostly this feedback has minimal effect (so-called negative feedback); it simply reinforces organisational systems. But every so often positive feedback - the seed of chaos - explodes the stability. An initially marginal event can, through positive feedback, be the cause of long-term dramatic events: the *butterfly effect*. The trouble is that there are innumerable marginal events out there.

Prevailing over the complex cut and thrust of the human activity system that is business is the dominant requirement of an intelligent human response: to sense a problem, and to identify what is appropriate and inappropriate action. Responding to a computer's output with a knee-jerk reaction is a formula for disaster – it needs a 'thinking manager' with a clear understanding of the context (technology, transportation, the company itself, its customers, suppliers, competitors, as well as in the broader political and regulatory environment.)

Only as tools that support 'thinking managers', rather than replacing them, can digital technology deliver its value. What the company doesn't need is a horde of machine minders. There is no 'being in control' here, only purposefully directing a system's procedures. All data is context sensitive.

Nuances of detail, as well as deliberate, accidental and arbitrary actions feed back and continuously modify, and amplify, elements, processes and sub-systems within a firm. The thinking manager knows that by squeezing complex human experience into the tidy data categories needed for computerisation, innumerable marginal details shear off: it only takes one to precipitate the butterfly effect. Data driven algorithms work fine in the linear world of physics/engineering, but in the non-linear world of human society they must be very carefully handled. Placing total faith in digital systems is asking for trouble. Chaos, a chain reaction of positive feedback, is waiting in the wings.

Business is like poker; there's a lot of bluffing going on. Players who put all their faith in the statistical distribution of the cards will lose their shirts. Many firms set out to control the world by computerising the arbitrary use of measurement; with performance measures, balanced score-cards, market research and polls, socio-economic classifications, efficiency audits, profiling, cost-benefit analyses. However, unquestioned acceptance of numerical simulations of open-ended non-linear human experience is sheer folly.

"It's not the figures lying, it's the liars figuring." Ask any manager at budget time! 'Thinking managers' recognise that all information is asymmetric – sender and receiver understand each message differently! The trick is ensuring the sender/receiver pair don't fall into the chaos of a positive feedback loop of compounded misunderstanding.

Thinking managers look for changing patterns among the information – no machine will ever

appreciate the human condition. Intelligent vigilance is crucial. They know there are no generic solutions. Every process and action must be filtered, customized, and continuously re-filtered and re-customised, placing the emphasis on experience rather than expertise, in an on-going learning process.

For a few companies, for a few individuals, the future looks very bright. Why? With new technology raising the spectre of ‘Virtual’ this and ‘Virtual’ that, you may be wondering if there is any future at all for business that is earth-based. Don’t. You needn’t worry. All wealth creation revolves around a meaningful application of information, so that it adds value to saleable (mostly physical) products. That value does not exist in some virtual reality, but in a very real reality; a reality of virtual enterprises yes, but they are doing deals, managing projects in economic hot-spots, all linked together by electronic, transport and human networks. And that takes thinking managers using the very best technology.

In the past thirty years huge sums were spent on Office Automation, and yet there was no increase in efficiency. Why not? Because the office was treated as a stand-alone entity, rather than as a single node in a network of partner organizations, that manages the value and supply chains. With the arrival of the generic Internet technology, and B2B systems, the office can now be integrated into the overall network, with huge savings made from the synergy found among partner organizations, and by leveraging the effectiveness of systems across the supply and value chains, firms can radically reduce the paperchase of invoicing etc.

The motto for everyone is ‘add value or perish!’ There is no room for sentimentality in a world where Quality is far more important than Quantity. Companies have no choice. They must ask, and answer, some very brutal questions concerning which workers are resources, and which are liabilities. That rare commodity, human talent, is the stuff of work in tomorrow’s world. For one thing never changes: the need for Innovation and Talent. Paradoxically, only talent can leverage the added value from technology. Seventy years ago, Joseph Schumpeter explained growth in terms of a rush of technological innovation unleashing competition between firms, thereby creating an upsurge in investment and new industries. However, innovation does not happen simply because of a capital investment in scientific research and technological infrastructure. These deliver mere possibilities. They are necessary, but not sufficient for success. Virtual Enterprises are necessary for a firm’s very survival, but there are no guarantees. They have to be managed effectively. Innovation cannot

be banked like capital or stored like a commodity. There can be no plans for innovation, only the initiation of the process.

It is the talented innovator who ultimately generates wealth. Hence labour and talent must no longer be treated under a single heading. Individuals are NOT standardized units. Talent, the great divider of humanity, must be seen as the diviner of economic success. Talent is in short supply, and so is in great demand. It's not the hours they put into the work, but the work they put into the hours.

Continuous innovation by the talent worker is the key to success. But there are clever people everywhere, so why is prosperity so unevenly distributed? Performance depends on a balance between social capital and the investment in both physical infrastructure and individual intellectual capital. This is where management comes in. For it is how a group sets about ruling itself, the type of rules it makes, the way it treats the creators of wealth, that separates success from failure.

There is no room for formal and impersonal (bureaucratic) arrangements that always involve greater transaction costs than the informal and personal. Informality is a statement of trust, formality a statement of control. A firm should have enough internal loyalty and trust so that it is self-organizing. By imposing restrictions and controls, a firm reduces internal variety, the very seed of the innovation it needs. By variety, I am not recommending a free for all. Freedom of action must be guided by an unambiguous set of shared principles. There has to be centralised strategic direction – I don't like the word control – direction of all data flows around the Information System that is the unifying force defining the company.

Without such coherence and cohesion, the complex network of contacts that is the virtual enterprise will collapse in a black hole of ambiguity, duplication of effort, misunderstanding, and waste. Clarity of accountability, supported by a centralised promotion of your core values, gives meaning to all that you are as a company. This is just another way of saying you are setting out to manage complexity.

And that takes trust. With trust the firm can adapt, not only to survive, but also to profit and prosper in the changing conditions. The imposition of inexplicable restrictions and controls reduces internal variety, the very seed of innovation it needs. A major task of management is

to build trust and social capital on a solid base. This means rejecting any imposition of control and coercion, and instead introducing an economic catalyst of investment, profit and incentive. Trust is the big word in tomorrow's commerce.

Spectacular growth comes from firms that thrive on their own energy. This energy drives a rapid, almost uncontrolled diffusion of technological techniques and knowledge. The hot-spot itself fuels the engine of growth by delivering innovation. But only within a network of trust relationships, that both mobilizes the intellectually gifted, and promotes and finances entrepreneurial activity by delivering the right incentives.

No company/country can succeed without a talented workforce, and so talent work must either go to where talent workers are located, or these alphas must be seduced away – the virtual enterprise again! One company that has grasped this new reality is Boeing. According to one spokesman: “Boeing's core business is not making aeroplanes, but knowing how to make aeroplanes.” In other words, as long as Boeing controlled the intellectual property rights, they could profit by building their planes anywhere they could find a talented workforce - hence their negotiations with Taiwan.

Firms have enormous opportunities by joining in ‘networks of trust’ supported by B2B projects. All markets are transitory. No single firm can muster all the necessary expertise and talents from within its own ranks in the limited window of opportunity available. No company can exist in isolation, hence the need to form long-term alliances.

Companies worldwide are looking for alliances to join in the identification and exploitation of the opportunities being thrown up by new technology and transportation. Building trust into the on-going project environment does not come with a series of one night stands. It takes commitment. Only in well-managed partnerships (friendships) will firms cope with the change being forced upon us all in the Information Age. Partnerships must always search out the best, whether it be at the end of the road, or the ends of the earth.

The motto for every business must: ‘Act Locally, but Think Globally and Link Globally.’ Their success will depend totally on the global network of contacts that is the virtual enterprise. These networks of skilled employees must be nurtured. Many technocrats have daft ideas about the Internet, video conferencing and the like, taking away the need to travel.

Forget what the technologists predict: impersonal electronic contact will not be sufficient! International travel, both business and social travel, will have to increase substantially as businesses set out to underpin global relationships.

Work can be done electronically. But group-work done over the Net is far more productive when it's done among friends. Project members will travel to socialise, to bond with their colleagues abroad, in order to create the network of trust, which is a prerequisite for the best work.

Only the thinking manager, on the basis of personal criteria, balancing the advice from a network of suppliers, colleagues and customers, can decide which approach is most appropriate as you face a world of complexity and uncertainty. We must live with uncertainty and love it. Enjoy the sheer wonder of it.

I hope I haven't bored you by going on and on about how important it is to understand the broader context. I just wanted to stress that if you can gather a right-thinking team about you, those who understand the complexity you face, then there are fantastic benefits from the best technology. However, get it wrong, then like Machiavelli, you'll feel the fires of hell beckon.

END OF TALK