

Perceptions of Wealth in
Information Networks:
Some Issues for the Banking
Sector

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Abstract

This paper will hypothesise on some of the issues facing the banking sector in the advanced capitalist economies as it tries to mediate and transfer value created by Information and Communications Technology (ICT) networks. Holding as axiomatic that these networks are social systems and have become the primary generators of wealth for the twenty-first century, it will explore some of the questions facing an intermediary who is trying to evaluate the period of uncertainty between the decision to engage in a productive activity involving an information based commodity and subsequent feedback from the market. The author believes that one of the most fundamental shifts in perception required to meet this challenge will be to understand that information networks operate under pluralistic as opposed to mechanistic rhythms of production. Applying traditional time metrics to evaluate their productivity and thus gauge risk exposure is at best of minimal use or at worst, completely wrong. Therefore this paper will base its success on the points it raises in the hope of stimulating debate about the future of mediation of networks.

François Jacob, one of the leading molecular biologists of our era, holds that an age or culture is characterised less by the extent of its knowledge than by the nature of the questions it puts forward. Thus what is important in science is as much its spirit as its product. It is as much the open-mindedness, the primacy of criticism, the submission to the unforeseen, however upsetting; as whatever results may ensue.¹ Keeping Jacob's injunction in mind, this paper will put forth as axiomatic the proposition that the industrial democracies have shifted their primary mode of generating wealth away from mass manufacturing in favour of communicating information over physical and virtual networks.

Information network systems on a societal scale such as the National Information Infrastructure (NII) of North America or the European Information Society (EIS) of the EU are being portrayed as the building blocks of a completely new paradigm of economic, social and political life. The visions encapsulated in position papers and public discourse on broadband networks are being invoked regularly by banking and non-banking entities striving to offer interactive services over a medium which even top researchers have difficulty in articulating with a high degree of confidence. Technology is being regularly referred to as the driving force behind the creation of 'virtual companies' or 'virtual banks' as if the medium represents nothing more than the digital extension of the previous paradigm of industrial capitalism. Moreover, the lion's share of debate has centred on the delivery mechanism for financial services and not what the services will be nor how an institution will adjust its asset base to accommodate the change in productive life.

Those using the techniques of traditional industrial analysis of the productivity of information and communications technology (ICT) networks have been perplexed by rapid technological innovation coinciding with extremely slow gains in measured productivity which have been summarised in a phrase attributed to Robert Solow: "We see the computers everywhere except in the productivity statistics." And yet virtually in the same breath Melody writes, "Economists are now just beginning to recognise that the most important resource determining the economic efficiency of any economy, industry, productive process, or household is information and its effective communication." The characteristics of information define the state of knowledge that underlies all economic processes and decision-making structures.²

Granted that information has become such a decisive factor, how does one characterise its impact across financial, social and political systems? This paper suggests that perceptions decide the nature and extent of that information a society deems as important and that which it discards from what the environment offers. Moreover, not only do perceptions guide decisions but also evolve the institutions which actualise these decisions into artefact, tradition and policy, let alone commercial gain.

¹ François Jacob. *The Logic of Life: A History of Heredity*. (1970 Editions Gallimard, Paris. Reprint Princeton, New Jersey: Princeton University Press, 1993), p. ix.

² William H. Melody, "The Information Society: Implications for Economic Institutions and Market Theory," in *The Global Political Economy of Communication*, edited by Edward A. Comer, (New York: St. Martin's Press, 1994), p. 21.

This does not mean that current strategies being offered by the banking sector to exploit ICT networks are necessarily wrong but instead that the methodology employed to investigate the domain of networked environments covers only what is relevant to finance as a discipline or banking as a profession and may not be what is needed to evaluate the risks and opportunities inherent in public networked systems. As Krutch says:

Once it has been admitted that human behaviour has its mechanical aspects, then it ought to be obvious that these are the aspects that the methods appropriate to the study of mechanism will reveal. If you study man by the method suited to chemistry, or even if you study him by the light of what you have learned about rats and dogs, it is certainly to be expected that what you discover will be what chemistry and animal behaviour have to teach. But it is also not surprising or even significant if by such methods you fail to discover anything else.³

Thus, before it embarks on the brave new world of interactive payment systems and 'virtual banking', the challenge for the banking sector will be to adjust its perceptions of the ICT networks. Adjusting perceptions is a shattering and creative experience for perception is the backbone of paradigms. Change perceptions and new paradigms become possible. Change paradigms and all bets are off.

Kuhn and others hold that paradigms gain their status because they are more successful than their competitors at solving problems that have come to be recognised as important, developing partially in terms of and in response to the most pressing and vital dilemmas of a particular time.^{4,5} Thus the Renaissance organisation developed in part because it became necessary to deal with the Black Death. Every technique of the Medieval world view was attempted to control the plagues--prayer, ecstatic mysticism, scapegoating, medicine based on sympathetic magic, and so on. All failed. Under the pressure of a critical problem that it cannot solve with its present conception and organisation of reality, a culture either develops a new one or, as the historian Arnold Toynbee has shown, goes under.⁶

The critical challenge which has faced the industrial democracies since the end of the Second World War has been to maintain ever increasing growth of physical production inherent in the paradigm of mass manufacturing in order to guarantee the upwardly mobile employment upon which social stability and the power of the nation state rests. By engaging in mass manufacturing, societies under industrial capitalism not only produced physical commodities but also produced steadily rising incomes brought about through productivity gains in manufacturing and the bellows effect of the

³ J.W. Krutch, *The Measure of Man*, (New York: Grosset and Dunlap, 1955), p.105.

⁴ Thomas S. Kuhn, *The Structure of Scientific Revolutions*, (University of Chicago Press, 1962), p.23.

⁵ Lawrence LeShan and Henry Margenau, *Einstein's Space and Van Gogh's Sky: Physical Reality and Beyond*, (New York: Macmillan, 1982), p.23.

⁶ LeShan and Margenau, p.24.

state regularly injecting wealth into the economy, becoming interwoven into the mythological fabric of capitalist societies--to be known loosely as the 'feel good factor' or the 'American Dream' or the Japanese promise of lifetime employment--which further enhanced the standing of the paradigm of mass production.

The 'feel-good factor' in the late twentieth century is perceived as having evaporated as present generations feel that they will not have higher living standards as preceding generations as per the capitalist social contract. Thus decision makers in the advanced countries have seized upon the potential of ICT networks as a panacea for alleviating persistent European unemployment or American underemployment or Japanese invisible unemployment. Public discourse in these societies is being bombarded by references to the 'knowledge economy' or the 'knowledge worker' or 'the productivity of information', the majority of which are attempts to fit the new realities of information networks within the paradigm of mass production.

Regardless of the varied explanations for the slow growth of the industrialised democracies or promises of a bright information age future from the shapers of public discourse, the overall impression of the citizens is that the halcyon days of high growth and high income based on manufacturing are over. Furthermore, massive job cuts--whether referred to as downsizing or rationalisation--have decisively impacted public perceptions to make the populations even less likely to believe their elites when they are told about how good things are--even if statistical data shows improvement.

The success of a paradigm--whether Aristotle's analysis of motion, Ptolomey's computations of planetary position, or Adam Smith's conception of the 'invisible hand' of the market--is at start largely a promise of success discoverable in selected and still incomplete examples. Economic theory, commercial success and government policy consists in the actualisation of that promise--an actualisation achieved by extending the knowledge of those facts that the paradigm displays as particularly revealing, by increasing the extent of the match between those facts and the paradigm's predictions, and by further articulation of the paradigm itself.⁷

Thus a paradigm gains its authority and its exponents draw their influence through its ability to make the raw data of the environment behave lawfully according to the concepts under which it was founded. Its ability to predict with a reasonable degree of congruence allows its practitioners to ameliorate risk as actors are able to adjust their behaviour to exploit what they perceive as the paradigm's positive attributes while avoiding its negative consequences. But it is when the explanations offered by a paradigm and the outside data reach a point of extreme divergence that the conflict of change becomes conscious even though the process might have begun long before. Thus, there is a palpable need felt by the elites in these societies to redouble their efforts to motivate discourse and effort as it becomes more apparent to populations that the end of the Cold War merely signalled the failure of communism as an organising system and was not the victory of capitalism.

⁷ Kuhn, P.24.

The pillars of capitalism, especially the banking sector are under increasing pressure from both within and without to somehow turn the productive potential offered by ICT networks into a new model to regain the high growth upon which they drew their power.

Yet it follows that when a society or system moves to a new way of perceiving production of commodities, those institutions which stood at the apex of the previous system have the most to lose. And even if they manage to survive, they will not be constituted as before. Most likely there will only be a tiny minority which make it to the next system with much of their power and wealth intact.

Moreover, ICT networks are calling into question the traditional monopolies of the state issuing the instruments of exchange and the banking sector mediating exchange as non-traditional financial agents without the capital overhang of the branch system are able to soon offer services and transaction processing at rates many banks can't match. And that is assuming that they are using current forms of currency let alone what would happen to an international broadband based trading area which is using multiple currencies.

Thus, the question of how banks will use the new information media for strategic advantage is misplaced for the majority of cases. For many financial institutions, it will be an issue of survival which itself is not guaranteed even if such institutions establish a presence on the new networks.

Information networks are not a new channel. They represent a new reality and as such, potential intermediaries must understand their productivity in order to gauge risks and opportunities. This has several ramifications. It implies that if the way humans are being productive has changed, then the nature of the wealth they produce has changed as well. Change the properties of wealth and you change everything for the banking sector--and the nation state.

Therefore, this paper will perceive its role as raising issues which the author feels are important towards understanding the productive potential of information networks. It is fundamentally concerned with their rhythms of production which it holds as having changed vis a vis that of industrial capitalism. It believes that the majority of productivity gains in these networks will occur outside of the organisations which manufacture network equipment and that these gains will be more often than not be a function of learning by network participants rather than improvements made upon network equipment. Therefore, owning and financing the tools of production no longer means ownership of production itself. This aspect will directly affect how risk is measured and appropriated on behalf of traders by an intermediary. Thus, excessive concentration on delivery technology for tokens of wealth or multimedia presentation for advertising or interaction by a customer is obscuring the larger issue of what will be the wealth created and traded by these networks.

I. Wealth and trust

A working definition for wealth or a commodity which the author will use would be those artefacts--whether physical or not--which meet the perceived needs of human beings living together in a political, cultural, economic and soon virtual area: the physical needs which make biological life possible, the reproductive needs which enable biological life to continue, and the mental, emotional and spiritual needs which make the act of living satisfying and which endow humans with a positive view of their future.

It is fair to assume that concurrent with creating commodities to meet their needs, humans possess a propensity to trade wealth either within their group or outside. Trade raises the variety of wealth and allows productive effort to be captured and exchanged between actors for the betterment of both. It also follows that the greater the propensity to trade, the more human groups will concentrate on what they perceive to be the most valuable wealth producing activities in the knowledge that they may exchange this for other wealth artefacts for their bundle of commodities.

Smith codified trade's benefit towards increased specialisation by affirming, "This division of labour, from which so many advantages are derived, is not originally the effect of any human wisdom, which foresees and intends that general opulence to which it gives occasion. It is the necessary, though very slow and gradual consequence of a certain propensity in human nature which has in view no such extensive utility; the propensity to truck, barter, and exchange one thing for another."⁸

Yet without effort there is nothing to truck, barter, and exchange. Thus it follows that the key towards wealth creation is embodied in the productive effort put forth by the human actors in a group. In the opening words of *The Wealth of Nations*, Adam Smith proclaims that it is not precious metals or their paper representatives that measure a nation's wealth. Smith's commodity is "the annual labour of every nation [that] is the fund which originally supplies it with all the necessaries and conveniences of life which it annually consumes, and which consists always either in the immediate produce of that labour, or in what is purchased with that produce from other nations".⁹

For Marx, wealth in capitalist societies presents itself as "an immense accumulation of commodities."¹⁰ A commodity has a use-value which expresses its utility. Use-values become a reality only by use or consumption and they constitute the substance of all wealth, whatever may be the social form of that wealth.¹¹ Concurrent with value founded upon utility lies value based upon exchange. Exchange-value, at first sight, presents itself as the proportion in which values in use of one sort are exchanged for those of another sort, a relation constantly changing in time and place. Marx held that as use-values, commodities are of different qualities, but as exchange-values they are

⁸ Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations*, Reprinted in Penguin Classics (London: Penguin, 1986) Book I chapter II, p. 117.

⁹ Smith, introduction.

¹⁰Karl Marx, *Capital: An Abridged Edition*, Edited with an introduction by David McLellan, (Oxford: Oxford University Press, 1995), p. 13.

¹¹ Ibid., p.14.

different quantities.¹²

Thus, the tokens of exchange--money--has assumed critical importance for it allows the utility value of a commodity which is a qualitative perception to be converted into an exchange-value which is a quantitative measurement. However far this abstraction may be taken, the fundamental point remains that it is the way human beings produce utility to meet their needs which will influence the value of the tokens they exchange and the system under which that exchange occurs. Change utility and you change everything.

Therefore, when one refers to money and the idea of legal tender, one is referring to the act of trusting that the instruments being presented by an issuer embody the potential to turn that instrument into a utility to meet a perceived need of the holder. Georg Simmel was a social philosopher rather than an economist, who went so far as to declare that "not a single line" of his most famous work was "meant to be a statement about economics."¹³ For Simmel, the foundation of any monetary order is trust--a phenomenon often expressed in intrinsically useless fiat money, but which is true of commodity monies as well. It is the underpinning of markets and is facilitated by the desirability of money as a transaction medium and its ability to hold its value. Even the acceptance of metallic money:

cannot develop without public confidence in the issuing government, or perhaps in the real value of the coin in relation to its nominal value. The inscription on the coins of Malta--*non aes sed fides* [not metal but trust]--indicates very appropriately the element of trust without which even a coin of full value cannot perform its function in most cases.¹⁴

Moreover, trust is more often than not the result of experience rather than fiat. Money is often tied with the concept of legal tender but such arguments are based on politics rather than practice. According to Simmel, legal tender laws appearing to ensure the acceptance of a particular money rely on the "probability that every individual, in spite of his ability to refuse the money, will accept it."¹⁵ Von Mises argument was similar:

The law may declare anything it likes to be [legal tender]. But bestowing the property of legal tender on a thing does not suffice to make it money in the economic sense. Goods can become common media of exchange only through the practice of those who take part in commercial transactions; and it is the valuations of those persons alone that determine the exchange ratios of the market. Quite possibly, commerce may take into use those things to which the state

¹² Ibid., pp. 14-15.

¹³ Georg Simmel, *The Philosophy of Money*, revised edition, trans. Tom Bottomore and David Frisby. (London: Routledge, 1990 [1978. Revised German Edition 1907] p. 54.

¹⁴ Ibid., p.179.

¹⁵ Ibid., p.180.

has ascribed the power of payment; but it *need* not do so. It may, if it likes, reject them.¹⁶

The decision to trust--in any human or human invention such as money--is based on perception: in Samuel Coleridge's phrase, "the outward Beholding"¹⁷--our ways of pre configuring and thus intuiting what we perceive, both literally with the physical sense and figuratively with the sense of the mind. That is, how we look things over and size things up.¹⁸

Perception is among the most difficult of human phenomenon to explore because it is simultaneously a product of objective and subjective realities. As Sacks and Wasserman have observed, "though one may separate out a small part of the visual cortex as an isolated unit as is necessary in a physiological approach, the visual cortex is part of the brain, and the brain is part of the organism, and the organism--every organism--has a world of its own in which perceptions become infinitely more than information carriers, become an integral part of the subjectivity, the feeling, the style of the individual."¹⁹ So it is with societies.

Perception moulds reality in a social system by assigning importance to information. What information a society considers to be important and what it discards does more than anything to identify its culture. Perception is, in essence, a society's way of contextualising experience into a public memory.

The public memory not only influences individual and social experience, it also creates boundaries between people and groups with greater efficacy and tenacity than political imprints have ever known. The Brenner Pass is one of the lowest and most gentle in the Alps yet has historically marked the border between Mediterranean and Nordic cultures. The Mason Dixon line denotes the border between northeast and southeast American culture. The Tokaido road marked eastern and western Japan for generations while the Berlin Wall became the physical focal point for the ideological battleground of the Cold War.

Drucker states that history too knows such frontiers. They tend to be unspectacular and are rarely noticed at the time. But once these divides are crossed, the economic, social and political landscape changes. Social and political climate is different and so is social and political language. Life and lifestyle become radically different between generations. Perceptions change thus there are new realities.²⁰

¹⁶ Ludwig von Mises, *The Theory of Money and Credit*, Trans. H.E. Batson. (Indianapolis: Liberty Classics, 1980 [1934; 1st German edition 1912]), p.85.

¹⁷Samuel Coleridge, *Biographia Literaria*, J. Shawcross, ed., (London, 1907), 2:218.

¹⁸ Don Gifford, *The Farther Shore: A Natural History of Perception*, (London: Faber and Faber, 1990), p.1.

¹⁹ Oliver Sacks and Robert Wasserman, "The Case of the Colorblind Painter" *New York Review of Books*, 19 November 1987, p. 32.

²⁰ Peter Drucker, *The New Realities*, (London: Heinemann Professional Publishing Ltd., 1989), p. 3.

Drucker asserts that for the developed economies, the new reality is that the primary economic resource is no longer capital, nor natural resources, nor labour. It is and will be knowledge.²¹ The central wealth creating activities will neither be the allocation of capital to productive uses nor labour. Value is now created by 'productivity' and 'innovation'; both applications of knowledge to work. The challenge of the post-capitalist society will therefore be the productivity of knowledge and the knowledge worker.²²

If we take Drucker's proposition as given then the task for the banking sector becomes clear. It must find a way of mediating the wealth potential of knowledge and passing that potential across generations. In order to do this, it must find a way of appropriating the risk involved in the production, distribution and exchange of knowledge based commodities. Its ability to meet needs and thereby generate trust in its instruments is based upon its understanding of the productivity of those using knowledge based commodities found in ICT networks to achieve their aims. This paper suggests that such productivity is a function of the network learning process.

II. Learning

The idea that productive activities require learning is hardly debated. This is unfortunate because the process--and the payoff--becomes far more interesting when we try to include some empirical and analytical background. Rosenberg holds that what we now call 'research and development (R&D)' is a learning process in the generation of new technologies.²³

At the basic research end of the spectrum, the learning process involves acquisition of knowledge concerning the laws of nature. Some of this knowledge turns out to have useful applications to productive activity. At the development end of R&D the learning process consists of searching out and discovering the optimal design characteristics of a product. At this stage, the learning is oriented towards the commercial dimensions of the innovation process: discovering the nature and combination of characteristics desired in the market and incorporating these in the final product in ways that take into account scientific and engineering knowledge.²⁴ This is a very subtle process and is indicative of the risks that are involved when a financial intermediary extends liquidity as a loan to back the production of a commodity.

The aspects of learning commanding most attention in recent years deal with learning by doing,

²¹ Peter Drucker, *Post Capitalist Society*, (Oxford: Butterworth-Heinemann Ltd., 1993), p. 7.

²² Ibid.

²³ Nathan Rosenberg, *Inside the Black Box: Technology and Economics* (Cambridge University Press, 1982), p. 120.

²⁴ Rosenberg, p.121.

which Arrow emphasised in his article, "The Economic Implications of Learning by Doing."²⁵ This is the form of learning that takes place at the manufacturing stage after the product has been designed, that is, after the learning in the R&D stages referred above have been completed. Learning at this stage, as described by Arrow, consists of developing increasing skill in production. This has the effect of reducing real labour costs per unit of output.²⁶ The point to remember is that the improvement in producing a commodity is a result of direct involvement in the productive process, reaching its apex in the Japanese conception and practice of *kaizen*.

Under the factory system, the banking sector could extend credit to those owners of the tools of production who were reaping gains brought by innovation and economies of scale. Ownership of the means to produce therefore carried a specific bundle of risks and opportunities from which the banking sector could profit. Moreover, the majority of the factors affecting the ability of a particular commodity to meet needs would be found within the proximity of the firm which produced the commodity.

However, it is questionable whether this strategy of productivity will apply to information networks. True, the physical equipment used to connect a network of human actors must be produced by the factory system but that in itself does not make the equipment productive. A second type of learning, which Rosenberg calls 'learning by using' distinguishes between gains that are internal to the production process (doing) and gains that are generated by subsequent use of that product (using). For in an economy with complex new technologies, there are essential aspects of learning that are not a function of experience involved in producing the product but of its *utilisation* by the final user.²⁷

Learning by using implies that the productivity to make the new networks valuable no longer lies exclusively within the firms that supply physical infrastructure, therefore owning the tools of production no longer guarantees that one owns the full benefit of production. It means that risks can no longer be bounded as tightly as under manufacturing and that the learning process of the end user has become more important towards the commercial success of a particular commodity than their simple ability to pay.

This is the aspect of the new networks which will concern the banking sector. We are accepting as axiomatic that future commodities will result from information travelling on networks. Therefore, the gains experienced by networks will be a function of information carried on these networks to meet the needs of network participants. But information in and of itself is of different value at different times to different people therefore, applying linear manufacturing based metrics towards assessing its relative value is an exercise in mental gymnastics which leaves its exponents exhausted as it becomes nearly impossible to invoke mechanical models to explain a phenomenon so closely

²⁵ Kenneth Arrow, "The Economic Implications of Learning by Doing," *Review of Economic Studies*, June 1962 as quoted in Rosenberg, p.121.

²⁶ Ibid.

²⁷ Rosenberg, p.122.

tied to human behaviour. In other words, the periods of uncertainty inherent in the decision to embark on a productive effort have changed qualitatively thus the wealth that will be produced will change in line with the changed risk.

IV. Risk and reward

We can conceive of the period of uncertainty between the decision to engage in a wealth producing activity and feedback from a market institution as the 'information float'. The key to understand is that 'information float' and 'risk' are basically one and the same process, thus it follows that whoever owns the information float will own the risk. Owning the risk implies owning the reward therefore it is the sine qua non of intermediation.

When an intermediary is familiar with the society's primary system for producing wealth, it can employ its asset base--the wealth of past production--more effectively. Knowing the utility of a particular commodity *and* knowing conditions of the market where such a commodity may be exchanged, an intermediary can assume risk by extending liquidity to an actor desiring to produce a commodity which can be traded in a market for a higher liquidity than what was risked. This process depends on the future being more productive than the past. Otherwise the risked liquidity is at best unchanged or worse is lost.

Thus it can be put forth that the banking sector was among the first human organisations to approach information gathering and analysis in a systematic and *secular* way for protection and profit. Unlike the medieval goldsmith who mediated risk on behalf of his client with his strong box, modern finance uses information. It has become an information-processing service industry.²⁸

With the widespread use of Electronic Funds Transfer (EFT) in the late twentieth century, banks have been transformed from depository institutions holding physical assets to information-processing centres. Money has gone from being a *tangible* entity with no intrinsic value to an *intangible* entity with no intrinsic value.²⁹ With EFT the true nature of money exchange as information exchange becomes apparent. In a barter or cash system, information is exchanged by exchanging objects that represent immediate value to the owners. In a currency or cheque system, information represents a promise of future exchange of value. In an EFT system, information is exchanged with immediate

²⁸ Douglas V. Austin; Donald R. Hakala; Thomas J. Scampani, *Modern Banking: A Practical Guide to Managing Deregulated Financial Institutions*, (Boston: Banker's Publishing Company, 1985), pp.37-38.

²⁹ C. Dianne Martin; Fred Weingarten, "The Less-Cash/Less-Check Society: Banking In The Information Age," in *Electronic Money Flows: The Molding of a New Financial Order*, Elinor Harris Solomon ed. (Boston: Kluwer Academic Publishers, 1991), p.188.

value.³⁰

Yet regardless of technical advances, a fundamental point must be remembered. Before it can appropriate risk to generate trust, an intermediary *must* be familiar with the way commodities express their utility and relate that with the commodities' exchange history in order to evaluate its exposure. This is a function of how well it is able to accumulate and make judgements on information generated by an economic system. It can then relate that information to the paradigm under which it operates to predict the future of activity and take steps to either profit or minimise exposure.

However, there come moments in history where there is a dramatic shift in the productive environment between generations and previously accumulated commodities and ways of perceiving the productive process may not be what the current and future generations require under the new model. It follows that if the use-values of commodities change then so must their exchange-values and it begs belief that a value adjustment of old commodities under a new system can be anything but negative.

Walter Wriston, retired chairman of Citicorp, has gone so far as to state that international financial market integration and the information links between markets have eliminated the effectiveness of past international structures such as the gold standard and Bretton Woods system and replaced them with an information standard, from which no one can resign and that makes policies and policy changes subject to instant judgement by traders who can react immediately.³¹

Thus, the banking sector profits or is punished by information. Until recently, it enjoyed virtually no serious competition in risk mediation because it had a huge--and hugely expensive--information gathering and processing infrastructure. But the technical capacity to gather and manipulate information has now become a commodity in itself and non-traditional players have increasingly the same access to information about production and consumption as the banking sector. The aspect which will decide who will make money and who will lose money will be found in how information is fitted within the perceptions of those seeking to profit from mediation. And these perceptions have become globalized.

IV. Electronic markets

Globalisation of commerce has made it imperative for those who produce commodities of all sizes to directly make contact and it is here where traditional perceptions of transaction mediation are being challenged. Kuula notes the most dramatic consequence of the growing globalisation is that

³⁰ Ibid., pp.188-189.

³¹ Walter Wriston as cited in Paul Zurkowski, "Liberation: The U.S. Experiment," *Intermedia*, 15(6) 1987, p.38.

there will no longer be the shelter of home markets.³² This means that even those companies that don't want to expand across national borders will have to create strategies against pressures from outside competitors trying to get inside the home market.³³ Regardless of whether a company or bank is planning overseas expansion or is defending home market share, it will be forced to learn about markets and firms far removed and will therefore have to invest in information and communications capability. It is part of an electronic market whether it likes it or not.

Bakos defines an electronic marketplace or electronic market system as an interorganizational information system that allows participants--whether buyers or sellers--to exchange information about price or product information.³⁴ He specifies five economic characteristics that distinguish this mode of exchange:

- a.) An electronic market system can reduce customer's costs of obtaining information about prices and product offerings of alternative suppliers as well as suppliers' costs of communicating information about their prices and product characteristics to additional customers.
- b.) The benefits realised by participants in an electronic market place increase as more organisations join the system.
- c.) Electronic marketplaces can impose significant switching costs on their participants.
- d.) Electronic marketplaces typically require large capital investments and offer substantial economies of scale and scope.
- e.) Potential participants in electronic marketplaces face substantial uncertainties regarding the actual benefits of joining such a system. Occasionally this uncertainty remains even after an organisation joins the system.³⁵

If it is true that the NII or other initiatives of this type will dramatically reduce the costs of information and communications and therefore accelerate the evolution of electronic market systems, it follows that a fundamental restructure of opportunities and roles within traditional industries and

³² J. Kuula, "Electronic Trade and Internationalization," *International Journal of Information Management*, Vol. 10, 1990, p.183.

³³ Ibid.

³⁴ J. Yannis Bakos, "A Strategic Analysis of Electronic Marketplaces" in *MIS Quarterly*, Vol. 15, No. 3, September 1991, p.296.

³⁵ Ibid., p.297.

the banking sector which serves them will result.³⁶ An Office of Technology Assessment report states: *Networking technologies can greatly reduce the costs entailed in exchange transactions. As these costs decline, many business activities will be shifted to the marketplace...The network will, in many instances, serve as the market. When this occurs, market structure will depend as much on network characteristics and the economies of networks as it does on relationships among firms.*³⁷

But it would be a mistake to read the OTA report as saying that markets are being created by technology. True, present markets are being enabled and new avenues of commerce are being opened up. But that which creates wealth in these new markets is not technology but those human groups who are able to conceive of needs not yet articulated within the environment and which employ technology to seize opportunities offered by the medium. That is a function of management the success of which is based upon how information is perceived and acted upon.

It can be put forth that the liquidity impacting electronic marketplace systems is based on the application and communication of information to meet the perceived needs of the participants. To meet those needs, participants are willing to trade. Thus within information one finds wealth. Fundamentally, knowledge is rendered from those signals agreed to be significant by agents participating on a network. What signals they *choose* to treat as significant will therefore, be a result of the paradigms under which they operate.

Therefore, one can suggest that the primary activity for producing wealth in electronic markets will involve creation and productive use of knowledge based commodities fabricated from information circulating on networks. These networks are dynamic learning systems consisting of physical and virtual infrastructure linking participants and their perceptions.

But under this model, what is money? Does monetary value relate efficiently to the value that is being exchanged? Henderson suggests that money, reflecting historical practices, is expressed in an ever changing array of "M" definitions substantially bound to physical attributes.³⁸ Thus, money in theory remains an inventory. However, money in an electronic marketplace includes forms which are substantially free of physical limitations and--paced by electronic based transfers--money is becoming a flow and a process. For Henderson, current public policy issues that arise from money and payment processes reflect the reality that has prevailed in the past decades. Money is conceived, defined and measured in physical terms; and payment processes are visualised, regulated, and evaluated in physical terms. Thus money came to be defined and measured when it came to 'rest' at the close of the business day.³⁹

³⁶ R. Benjamin and R. Wigan, "Electronic Markets and Virtual Value Chains on the Information Superhighway," *Sloan Management Review* Winter 1995, p.63.

³⁷ Office of Technology Assessment, *Electronic Enterprises: Looking to the Future* (Washington D.C.: U.S. Government Printing Office, OTA-TCT-600, May 1994).

³⁸ Paul B. Henderson Jr., "Modern Money," in *Electronic Funds Transfers and Payments: The Public Policy Issues*, edited by Elinor Harris Solomon, (Boston: Kluwer Nijhoff Publishing, 1987), pp.17-18.

³⁹ *Ibid.*, p.21.

This idea of money coming to 'rest' at the end of the business day is fundamentally connected with linear perceptions of time. The instruments issued by the banking sector to represent wealth are based upon a perception of money as a physical entity and transactions which are sequential.

But perception of time will be vital for appropriating risk in information networks as technology has collapsed information floats for transactions to where they have become virtually instantaneous. Thus, it follows that those actors who are in tune with the rhythms of information networks will be in a better position to appropriate risk on behalf of traders.

A substantial aspect for 'getting in tune' will be to recognise the difference between the temporal environments of the infrastructure which makes electronic markets possible and the temporal perceptions of the participants who make the market valuable. Moreover, it is their learning processes which will follow not the standardised world of technology but the cultural world of the network. Infrastructure operates in standardised linear time which has been practical on a global basis for less than one hundred years. Furthermore, humanity was bound to its rhythms in order to exploit the paradigm of mass manufacturing. Whether this can continue to be a sustaining perception is addressed in the next section.

V. Networks, time and culture

On the night of April 14, 1912 at 11:40 P.M., the *Titanic* struck an iceberg after steaming recklessly through an icefield in the North Atlantic. The captain deduced that they were going to sink fast and at 12:15 A.M. ordered his wireless operator to send the distress call. At 1:06 A.M. the operator on the *Carpathia* heard the *Titanic* tell another ship coming to help, "Get your boats ready; going down fast on the head." The world began to get news of the disaster at 1:20 A.M., when a wireless station in Newfoundland picked up the message that the *Titanic* was sinking and was putting women off in boats. The *Titanic's* wireless had a range of 1,500 miles, so signals to Europe had to go first to New York, and then across by cable; still, by early morning the entire world was privy to the disaster.⁴⁰ To one of the survivors in a life boat it seemed as if the stars above saw the ship in distress and "had awakened to flash messages across the black dome of the sky to each other."⁴¹

On April 21, the *New York Times* marked the power of wireless communication which had been

⁴⁰ Walter Lord, *A Night to Remember*, (New York: 1955); Richard O'Conner, *Down to Eternity*, (New York: 1956); Peter Padfield, *The Titanic and the Californian* (London: 1965); Geoffrey Marcus, *The Maiden Voyage* (New York: 1969)

⁴¹ Lawrence Beesley, *The Loss of the SS Titanic*, (New York: 1912), p.101.

transformed overnight from being a technology to a social system. The age of networks had begun:

Night and day all year round the millions upon the earth and the thousands upon the sea now reach out and grasp the thin air and use it as a thing more potent for human aid than any strand of wire or cable that was ever spun or woven. Last week 745 [*sic*] human lives were saved from perishing by the wireless. But for the almost magic use of the air, the *Titanic* tragedy would have been shrouded in the secrecy that not so long ago was the power of the sea....Few New Yorkers realise that all through the roar of the big city there are constantly speeding messages between people separated by vast distances, and that over housetops and even through the walls of buildings and in the very air one breathes are words written by electricity.⁴²

It is common to suppose in this information glutted age that networks are infrastructure--"they are composed of links that connect nodes."⁴³ Yet this strictly reductionist view of networks must be abandoned if further progress is to be made. Network nodes don't move data--they connect people who have agreed that the signals transmitted by those nodes are significant and as such, are social systems rather than the sum of technology. Being social systems, they evolve in time and occupy physical and cultural space.

Zuboff holds that technical change not only defines the horizon of our material world but also shapes what is possible and what is barely imaginable.⁴⁴ New opportunities are opened, others are closed, changing our world and our relation to and within it.⁴⁵ In the context of information networks, it is no longer just the horizon of the material world that is being shaped; it is the experience of time and distance for the network participant.

Hall conceives time in a social sphere as, "a language, a primary organiser for all activities, a synthesiser and integrator, a way of handling priorities and categorising experience, a feedback mechanism for how things are going, a measuring rod against which competence, effort, and achievement are judged as well as a special message system revealing how people really feel about each other and whether or not they can get along."⁴⁶ Hall goes on to state that time is a core system of cultural, social, and personal life. A complicating factor in intercultural relations is that each culture has its own time frames in which the patterns are unique.⁴⁷

It follows that cultures adopt their timekeeping systems to match their rhythms of production and

⁴² *The New York Times*, 21 April 1912.

⁴³ Nicholas Economides, "The Economics of Networks." Plenary session address, E.A.R.I.E. conference, Chania, Greece, September 1994.

⁴⁴ S. Zuboff, *In the age of the smart machine*, (New York: Basic Books, 1988).

⁴⁵ *Ibid.*

⁴⁶ Edward T. Hall, *The Dance of Life: The Other Dimension of Time*, (New York: Anchor/Doubleday, 1983), p.3.

⁴⁷ *Ibid.*

reproduction. Thus judging the information float within a particular culture implies that one is familiar with the way in which that culture perceives time. It also follows that if a human group changes its way of producing wealth, it changes the way it perceives productive time. Timekeeping can be conceived in the context of the technology but such an approach fails to account for the social system which contextualises the data supplied by the technology into the perceptions of participants and thereby influences what information they regard as important and what they discard along with the risks and opportunities they create.

Gifford writes that by the early nineteenth century, when the transforming effect of the industrial revolution began to be felt in England, the clock had become the measure of the labourer's time.⁴⁸ In an essentially agrarian economy, time and the work it measures tend to be patterned by the biological rhythms of domestic animals and by the seasonal rhythms of crops. In an industrial community, when the factory clock takes over, the work day is even less subject to seasonal variation. Time, measured by the factory clock and whistle, relinquishes its bio-logic, and becomes the coinage, money for worker and employer alike, whether the relation is determined by daily or hourly wage or piecework.⁴⁹ Overtime is a distinctly machine made concept of time, on its way to becoming vacation with pay. These concepts were possible only in the factory.⁵⁰

Kern believes that the most momentous development in the history of uniform public time since the invention of the mechanical clock in the fourteenth century was the invention of standard time in the nineteenth century.⁵¹ Yet the invention of standard time was not achieved by any government although there were many scientific and military arguments for world time. It was a necessity for the railroad companies who were the first to institute it. Around 1870, if a traveller from Washington D.C. to San Francisco set his watch in every town he passed through, he would set it over two hundred times. The railroads first attempted to deal with this problem by using a separate time for each region. Thus cities along the Pennsylvania Railroad were put on Philadelphia time, which ran five minutes behind New York time. However in 1870, there were still about 80 different railroad times in the United States alone.⁵² The day the railroads imposed a uniform time, November 18, 1883, was called "the day of two noons," because at mid-day clocks had to be set back in the eastern part of each zone--one last necessary disruption to enable the railroads to end the confusion that had cut into their profits.⁵³

Governments then became aware of the importance of standardised time, and in 1884 representatives of twenty five countries convened at the Prime Meridian Conference in Washington where they

⁴⁸ Gifford, p. 97.

⁴⁹ Ibid.

⁵⁰ Ibid. p. 98.

⁵¹ Stephen Kern, *The Culture of Time and Space 1880-1918*, (Cambridge Massachusetts: Harvard University Press, 1983), p.11.

⁵² According to a pamphlet by Charles Ferdinand Dowd, *A System of National Time for Railroads*, there were at that time eighty different time standards on the American railroads.

⁵³ Kern, p.12.

proposed to establish Greenwich as the zero meridian, determined the exact length of the day, divided the earth into twenty four time zones, and fixed the precise beginning of the universal day.⁵⁴ But the world was slow to adopt the system for all its practicality.

The French finally took the lead in the movement for unified world time based on the Prime Meridian guidelines of 1884. If the zero meridian was to be on English soil, at least the institution of world time would be in Paris. So President Raymond Poincaré hosted the International Conference on Time in 1912, which provided for a uniform method of determining and maintaining accurate time signals and transmitting them around the world.⁵⁵ The observatory at Paris would take astronomical readings and send them to the Eiffel Tower which would relay them to eight stations spaced across the globe. At 10 o'clock on the morning of July 1, 1913, the Eiffel Tower sent the first time signal transmitted around the world. The independence of local times began to collapse once the framework of a global electronic network was established.⁵⁶

If anything, the globalisation of the world's economy can be dated from 1913. At that point, it became possible for international finance to take advantage of a newly uniform public time. Credit and all its supporting instruments could be extended far beyond national borders in the knowledge that the prime metric covering an agreement--its duration--had been standardised and improvements could be made in the performance. Firms could invest in projects overseas and be able to calculate the production runs that the owners might have never seen nor will ever see but could estimate inputs and outputs necessary to convince their creditors--the banking sector--to extend liquidity for projects thousands of miles removed from the source of capital.

Standardisation of time drastically improved the productivity of manufacturing due to the synchronising of not only the work in the factory but the work of *other* factories, reaching its apex in the Japanese invention of just-in-time inventory control. Again, information and communications technology enabled the concept to be enforced and fed into the perceptions of those participating such that a single uniform time was natural.

This standardisation endowed intermediaries with the capacity to benchmark not only similar industries but also unrelated industries and provided the decisive ingredient for Kuznet's "extended application of science to problems of economic production." Most importantly, by standardising time, there was standardisation of the information float and therefore, standardisation permeated perceptions of risk by the banking sector.

Thus it follows that in a world where the extension of liquidity and the production of wealth was based upon a standardised public time, the rest of society would follow suit and many of the private times would collapse as the rhythms of production became aligned not only with the clock on the factory wall, but the more important clock on the wall of a stock market.

⁵⁴ Ibid.

⁵⁵ Kern, p.13.

⁵⁶ Kern, p.14.

However, modern information networks throw the logic of uniform public time aside due to their anyplace asynchronous nature. Private times are beginning to surface again as the productivity of knowledge is far less dependent on standardisation as that of physical production. Even telephony has changed as answering machines, fax, telex, and email have enabled the individual not to submit their productive time to the demands of the machine.

Since the days of the wireless, the most productive aspects of networks have been those factors which extend and improve the quality of the human voice over time and distance. The prime factor affecting voice communication has been the synchronisation required for real time communication. In 1912 another ship--the *Californian*--could have saved all the passengers but wasn't in wireless contact. Approximately 19 miles away, its wireless operator had hung up his earphones for the night about ten minutes before the *Titanic* sent out its first distress call. Two watchmen on deck saw the rockets fired by the *Titanic* but could not figure out what they meant or convince their captain to hoist anchor and find out.⁵⁷

Whether participants send email or fax or employ answering machines, call waiting or call forwarding--they are enhancing the productivity of voice communication. Modern networks provide voice and voice surrogates in an anyplace, asynchronous format.⁵⁸ Anyplace communication transcends geographic barriers and enables network agents to access the agents and resources they need to fulfill their perceived needs.

In essence, asynchronous networks now mediate communication by evolving temporal possibilities. It follows that if a participant can access a message from another participant anytime anyplace, then the transaction is enhanced, enabling the participants to enter more message transactions and thereby increase their variety. Thus one can put forth that asynchronous anyplace networks provide liquidity to knowledge based economies and alters their experience of time. It is here where the most dramatic changes in production are taking place and where the greatest shift in perception is required for the banking sector to mediate the new information floats.

Social spaces for production now exist independent of the factory institution and its attendant standardisation, being endowed by activities which in order to be productive, take on new forms of expression and realisation of time. Ishii writes that we do not interact with computers but *through* computers.⁵⁹ Operating a computer is not a goal in itself for the vast majority of people; to most of the population, the greatest potential for computers lies in their capabilities as media for human-human interaction.⁶⁰

⁵⁷ Walter Lord et al.

⁵⁸ Linda Harasim, "Networlds: Networks as Social Space," in *Global Networks: Computers and International Communication*, edited by Linda Harasim, (Cambridge, Massachusetts: MIT Press, 1993), p.22.

⁵⁹ Hiroshi Ishii, "Cross-Cultural Communication and CSCW," in *Global Networks: Computers and International Communication*, Linda Harasim ed. (Cambridge Massachusetts: MIT Press, 1993), p.146.

⁶⁰ Ibid.

Thus the productivity of human-human interaction rather than human-machine interaction is the primary challenge for the knowledge society. It suggests that the previous metrics for improving on the productivity of human-machine interaction might not be that which makes the new networks productive. Computer networks are no longer tools whereby humans network; they have become *places* where humans network.⁶¹ Some of the same technology that allowed for the creation of uniform public time in the early twentieth century are evolving pluralistic public time for the twenty first century.

Networks as social spaces have several implications for the banking sector. It implies that ICT networks are enabling agents to extend their ties of community outside of traditional geographical and temporal constraints. This suggests that if anything, the rhythms of production on networks will become more pluralistic as they expand across cultures. It is debatable whether the standardisation of time which enabled such impressive gains in human-machine productivity will transfer seamlessly towards improving human-human productivity.

If one assumes that technology drives history--and there are persuasive arguments on either side--then one should be able to predict the information float inherent in a new technological possibility simply by extrapolating from past experience. Yet Rosenberg holds that historical analysis supports the view that technological change often takes place in quite information-poor and uncertain environments. The paucity of information on the part of the decision makers powerfully constrains their ability to assess the consequences of technical advance.⁶² Moreover, it is important to recognise that firms have little incentive to be fully aware of technological options which are not going to be used within the present production process. The reason is simple: acquiring new information is costly.⁶³

Just as it is a dangerous thing to judge what a person thinks simply from the books on their shelf, caution is necessary when perceiving the utility of ICT networks as a direct function of technology. How the banking sector perceives of ICT networks will heavily influence what information it deems important regardless of whether or not the information environment is rich or poor. It must be able to grasp critical information from the glut of fact and more importantly, discard that information from its past experience that *does not* apply to the new realities in order to gauge the uncertainty inherent in a productive activity within a network system. And so we are back where we started--at perception.

Historically, perception of ICT networks by the banking sector has been driven predominately by its having used them for information processing. It is a view of linkage as the sum of technology--a bureaucratic conception of information that stresses collection, collation, processing, and reporting. The industry feels that its information processing skills uniquely qualifies it for mediation between

⁶¹ Harasim, p. 15.

⁶² Nathan Rosenberg, *Exploring the black box: Technology, economics, and history*, (Cambridge: Cambridge University Press, 1994), p.5.

⁶³ Ibid.

newly connected participants across borders of time and distance. The banking sector is convinced that its previous affiliation with capital automatically endows it with the capability to assess the potential of networks.

Such perceptions must be challenged lest it repeat the *Titanic's* fate.

VI. Conclusion

LeShan and Margenau state that the sources from which a field of expertise grew remain within it as a shadow skeleton, and these sources partly define for it what is real and what is true, what is sense and what is nonsense--in short, what is the basic shape or essence of its reality.⁶⁴ When the field develops so that new data contradicts old beliefs, a basic conflict develops in a field of knowledge. There is great difficulty and struggle in recognising, organising, and solving the new problems presented by the conflict of new data and the old beliefs and orientations.⁶⁵

As our calendars tick off to the millennium, one must pause and ask whether many of the currently anointed interpreters of productive experience--government, business, media, academe and the banking sector--have sufficient enough conception of the risks and rewards of ICT networks to claim decision making authority. Such authority in whatever age is based upon the structure under which reality is perceived and how well that structure makes data behave lawfully.

Singer Bob Dylan's "Something is happening, and you don't know what it is, do you, Mr. Jones?" can be considered as emblematic of a fundamental disquiet stemming from the persistent attempts by institutions at the apex of the present system to convince the public that they have a good idea of the future evolution of public broadband networks while internally scrambling to make sense of data which is not fitting into their perceptions of the way wealth is created.

Therefore, for next few decades we are not looking at evolution--the extension of a paradigm, or revolution--the replacing of one paradigm by another, but dislocation--the period of time when the old order is clearly failing but the new order has yet to be articulated. It is a time for tactics (dealing with the known) and also a time for strategy (dealing with the unknown) but it is not a time for misplaced confidence that previous competence and influence will guarantee future success.

For one must remember that paradigms are more than just accepted models, patterns or innovations. They are new ways of perceiving reality and as such, exist in conflict with one another as they represent the struggle between perceptions for resources and allegiance. Thus they are as much about power as knowledge for their success or lack thereof simultaneously empowers and

⁶⁴ Lawrence LeShan and Henry Margenau, *Einstein's Space and Van Gogh's Sky: Physical Reality and Beyond*, (New York: Macmillan, 1982), p. 3.

⁶⁵ *Ibid.*

disadvantages individuals, institutions, and sovereign states.

Creating Internet web pages to claim that this bank or that bank has the best encryption technology or offers the most friendly interface does nothing to build trust in the services being offered. Only execution will do that and for the most part, the banking sector is operating under the illusion that the current populations of retail customers will remain loyal on-line as they did off-line. The closer truth is that banks have historically been able to count on customer "loyalty" dues to high switching costs and a modicum of interest on the wealth they deposit.

Transaction processing will come only *after* and not before the banking sector forms relationships with those creating wealth on broadband networks. And their patronage will be as much a function of the individualised services that a potential financial service provider can offer as the ease with which they transmit funds. Moreover, it is a fair bet that among their most vital business objectives would be to make contact with other network participants. Just as human-human productivity is a vital wealth creating factor, so will customer-customer interaction be an important function for potential financial intermediaries.

Whatever impacts the learning process of network participants makes them more able to produce wealth within network environments and it also implies that such wealth may not take on the same character as that which came before. Moreover, it is questionable as to whether standardised perceptions of productive time will allow the information these people create to be acted upon meaningfully. For if we imagine that information is the new engine of growth then we cannot run commerce as we did mass manufacturing lest we handicap its potential to offer improvement of our condition. For the most part, the best that can be hoped for in this time of dislocation is that potential financial service providers--whether banks or not--possess the sensitivity to know that fundamental change is in the wind and have the guts to trust imperfect human judgement instead of relying in technical wizardry--and learn.