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Intellectual Capitalism - An Overview

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This article argues that a new economic order, intellectual capitalism, emerges as two main streams of world events confluence. The first is the transition to a more knowledge-based society, or information society. This transition is shown by many indicators and has been recognized by many authors. We spend an increasing share of our lives on learning, products and services have become increasingly information-intensive, firms have become increasingly dependent upon competencies of diverse kinds, investments increasingly have become intangible in character and so forth. This is a gradual transition that has been going on for many decades, but it seems that the decades surrounding the new millennium are a turning point in the sense that information, knowledge – whatever we want to call it – is becoming dominant by various measures.[1] The transition is not due to chance or some outside force or major event but instead it is the historical consequence of cumulative learning by generations of individuals and the willingness of Mother Nature to reveal herself to inquirers. Of course many factors may give twists and turns to this collective learning process, but essentially it is an irreversible process of cumulation, apart from major destructions, until limits of some kind – physical, economic, behavioral – are reached. Cumulation of advances in science and technology (S&T), and the emergence of information and communication technologies (infocom technologies) in particular, are especially important components of the learning process behind the transition.[2]

So far, there is actually nothing new or surprising about this. However, does a knowledge-society have to be capitalistic in some sense? Not necessarily. There is a

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1. Authors frequently make a distinction between information and knowledge (sometimes between data and information and between knowledge and wisdom as well) with the general implication that knowledge is a refined form of information with more meaning and value, but less codified than information. Although, often an important distinction, it is of less relevance at the level of analysis here. In particular 'technology' is used here for both technical knowledge and technical information.
2. The concept of infocom technologies is here taken to encompass information and communication technologies (computers, telecommunications, media, networks etc.)

widespread notion in the West and East that knowledge by and large is and should be a publicly available good. Knowledge also has properties that make it difficult, even impossible, to privatize and transact in the same way as physical goods. Nevertheless, knowledge and information have been subjected to private control or restrictions in various ways historically, with as well as without capitalism. A good example is military information and military technology.

The second stream of world events concern the actual strengthening of capitalist economic systems. This event stream has been rapid and surprising in recent years. Despite various prophecies to the contrary – wishful or not – capitalist economic systems are as strong as ever after the post-war rise of competitive Asian economies, the downfall of the Soviet Union, and the resurgence of the US economy in the 1990s.[3] As a result traditional capitalist economic institutions such as markets, firms and private property rights became dominant in the world in the 1990s, and the frontiers of capitalism are being advanced without any strong, competing economic ideology at present.

A specific economic institution, even older than capitalist industrial society itself, is the system of intellectual property rights (IPRs), including not only patents but also trademarks, trade secrets, copyrights, designs and artistic works. The intellectual property rights system has historically not been considered a strong and important element of traditional capitalism.[4] However, in the 1980s the patent system became significantly strengthened in the USA and a so-called "pro-patent" era emerged for various reasons. One strong reason was the concern that US industry had difficulties in protecting and exploiting its investments in R&D and new technologies in view of the competitive successes of several Asian economies, Japan in particular. This development can be seen as an important symptom of the transition towards intellectual capitalism, and it has focused wide attention upon patents, intellectual property rights and intellectual capital matters in general.

Purpose

The purpose of this article is to elaborate the notion of intellectual capitalism and argue that intellectual capitalism is evolving in society due to various factors, and with more or less unknown consequences.

The shift towards intellectual capitalism could be elaborated at greater length than possible here, pertaining to developments at the levels of the individual, profession, company, industry, market, technology, management, institution, nation and international economy. Here, the role of technology in general and infocom technologies in particular will be emphazised. The article also overviews concepts related to intellectual capitalism and evidence and arguments pointing at the shift to such an economic order. Related literature will be overviewed as well. The overviews will be made brief, however.

What is Intellectual Capitalism?

Literature overview

Needless to say, capitalism comes in many

3. Many scholars would (rightly) attribute these events to different abilities of the economic systems in generating and exploiting new technologies, infocom technologies in particular. Thus the two event streams are better regarded as interdependent and reinforcing each other than converging from separate origins in some sense.
4. Indeed there are writings on the economic institutions of capitalism which disregard the IPR-system altogether.

varieties and is evolving in various ways.[5] Much has also been written on diverse types of capitalism, seen as emerging in contemporary society, such as "alliance capitalism", "corporate capitalism", Japanese form of capitalism, "stakeholder capitalism", "informational capitalism", etc. (see Drucker (1993), Dunning (1988), Gerlach (1992), Johnson (1993), Rosenberg and Birdzell (1986), Rosenberg (1992), Thurow (1996), Williamson (1985)). To be sure, the future of capitalism has at each stage in its past attracted great attention. Among past scholars, Marx and Schumpeter stand out. Several works of current scholars have already been mentioned. Table 1 gives an overview of the works of some widely recognized scholars on the future of capitalism.[6]

However, while there is substantial consensus among current scholars that we are approaching something like the information (knowledge, service, post-industrial etc.) society (age, era, economy etc.), there is not (yet) much emphasis on aspects like private ownership and control of information and knowledge and its rent streams. There are much writings on capitalism as well as on the emerging information society but to my knowledge there is not much written which particularly focus on the features of intellectual capitalism, being in simple terms a confluence of capitalism and the information society. The terminology varies, of course, and various writings on 'knowledge capitalism', 'informational capitalism' etc. come close. However, intellectual capital as will be described below, is a broader concept, encompassing not only knowledge and information.

Finally, there has been a rapidly growing flow of writings on intellectual capital (rather than intellectual capitalism), mostly in the context of a firm and with perspectives from business practice, accounting, management, etc. Some examples are IVA (1993), Stewart (1997), Edvinsson and Malone (1997), and Boisot (1998).

What is Intellectual Capital?

Intellectual capital, in contrast to physical and financial, comprises all immaterial resources that could be considered as assets. These assets are being possible to acquire, combine, transform and exploit, and in principle being possible to assign a capitalized value. In this general sense, the concept of intellectual capital applies to any economic agent – an individual, a firm or a nation. The firm is a key agent in being a repository and cumulator of intellectual capital, so it is of primary interest to specify the concept in that context. Table 2 gives an overview of resource categories in a firm, and at the same time gives a description of the concepts of intellectual capital, intellectual property, relational capital and human capital.

"Intellectual" is thus used as roughly synonymous with "immaterial", in turn meaning non-material (as distinct from insignificant)[7]. "Human capital" is commonly used

5. In fact, the diversity and dynamism of capitalist forms of organizing economic activities could almost be taken as a defining characteristic of capitalism as an economic system. Also the word 'capitalism' did not come into use until fairly late (in the 19th century) and then came to loosely denote the whole variety of capitalist forms without a precise connotation (see Rosenberg and Birdzell (1986)).
6. Other and more works could have been selected, of course. Drucker (1993) , Rosenberg and Birdzell (1986), Rosenberg (1992) and Thurow (1996) have been chosen as recent works by prolific and well-known writers, together representing both economics and management perspectives.
7. Unfortunately, the term "immaterial" in English means both non-material and non-significant. Thus, the more narrow term "intellectual" is used.

Table 1. Characterization of some authors on the future of capitalism[1)]

Author	Future of capitalism	Main characteristics of future stage	Type of transitory mechanism	Main driving factors in transition
Marx	Socialism/ communism	State-owned means of production	Self-destruction	• Growing social pain and inequalities • Wasteful business cycles, instability, duplication and differentiation • Concentration of capital and political power • Exploitation of workers and public resources • Growing hostility among workers against capital owners • Worker-led revolution
Schumpeter	Socialism	State-owned means of production	Self-destruction	• Increasing obsolescence of the entrepreneurial function • Destruction of protecting stratum • Destruction of capitalist institutional framework • Growing hostility in society in general towards capitalism
Drucker	Post-capitalism	Knowledge as primary resource Capitalist institutions survive New "classes" – managers, service workers, intellectuals	Gradual evolution[2)]	• Knowledge and knowledge workers • Management • ?[2)]
Rosenberg	Evolution	Continued experimenting and modification of capitalist institutions	Self-construction	• Inherent experimental feedback structure
Thurow	Stagnation	Capitalism with stronger dependence upon human capital and "brainpower" industries	Lack of competing economic system	• Technology • Ideology

1) The characterizations are gross simplifications by necessity.

2) A specific transitory mechanism is not explicated, nor is a set of main driving factors.

Table 2. Resource categories of a firm

Material (Tangible)		Immaterial (Intangible) (IC)[1]		
Physical capital	Financial capital	Intellectual property rights (Disembodied IC)	Good-will and power in internal/external relations (relational capital)[2] among	Human (embodied) competence (capital)
Natural resources Raw materials Buildings Machinery Work in progress Inventories etc.	Liquid capital Bonds Shares Securities etc.	Patents Databases Know-how Licenses Trade secrets Trademarks Designs Software Copyrights Concessions etc.	Employees Customers Suppliers Competitors Universities Investors Interest organizations Societies etc.	Managerial Technological Commercial Financial Legal Manual etc.

1) Exactly what IC should encompass is debatable but it should definitely include IPRs as well as human competence (or capital or capability) and good-will. For simplicity, IC will here be taken to comprise all immaterial or intangible resources or assets, admittedly with some conceptual borderline problems.
2) It is possible to distinguish the category 'relational capital' (including e.g. trust and internal motivation) as well as 'organizational capital' (or 'capability') from IC. Here we rather use these categories as sub-categories of IC.

to refer to intellectual capital embodied in humans, excluding intellectual property rights.[8]

Intellectual capitalism

What then is intellectual capitalism? Standard dictionary and textbook definitions of capitalism refer to an economic system characterized by private ownership of the means of production and by operation of a market with enterprises competing for private profits, etc.[9]

Hence a necessary condition for intellectual capitalism to be present is to have private ownership of intellectual capital. This is what the intellectual property rights system as an institution allows for. However, most intellectual property rights are temporary, and when patents and secrets expire, the corresponding information becomes public property.[10] In that sense, there is a feature of "intellectual socialism" as well. Still, if the share of industrially useful knowledge

8. Distinctions between terms such as competence, knowledge, information, data etc. are often useful for detailed analysis. For an overview, see EC (1997).
9. According to Gardner (1988, p.4) an *economic system* is defined as «a set of institutions involved in making and implementing economic decisions». An *institution* in turn is defined as «an organization, practice, convention, or custom that is material and persistent in the life of culture of a society» (op. cit.). Examples of capitalist institutions are business corporations, banks, competitive markets, property rights and profit motives.
10. The circumstance that patented knowledge is publicly disclosed is equivalent to viewing it as privately owned knowledge being leased or licensed out for free under certain limiting conditions on its commercial use by the licensee.

generated in the private domain compared to the public domain is large, and if its growth rate is also large, then at some point privately held knowledge will dominate. For example, if technical knowledge is doubled every seventh year and all new knowledge is privatized through patents for twenty years before it becomes publicly owned, then close to 7/8 (= 87.5%) of the knowledge is under private ownership at any one point.[11] The exact figures are not important here, of course, but what is important is the fact that if privately held knowledge grows faster than that which is publicly held, it will dominate in the not so distant future.[12]

In broad terms intellectual capitalism can be interpreted as a confluence of a capitalist economy and a knowledge or information economy. More specifically, intellectual capitalism is taken here to refer to an economic system with basic capitalist institutions (private property rights, private profit, competitive markets and free enterprise) in which productive assets and processes, as well as commercial transactions and products, are predominantly intellectual or immaterial rather than physical in nature.

Indicators of intellectual capitalism

In order to justify talking about the presence of intellectual capitalism, it is thus required that intellectual capital in some sense dominates as a means of production, compared to physical means and that it dominates capital values and investments. Several indicators can then be used, e.g. based on Solow-type residuals, Tobin's q, Becker-type accounting of human capital, and the ratio of intellectual capital investments to physical investments, a ratio that in many technology based firms exceeded 50% in the 1980s. (See further Granstrand 1999b.) The practical accounting problems are large, however, and efforts are being made to develop new accounting concepts and methods.[13]

Indicators of the emergence of intellectual capitalism further include the growth of intellectual capital based firms, professions and personal wealths, emergence of technology markets and other intellectual capital markets, and growth of intellectual capital products. In summary, one can observe not only a growing share of intellectual capital in traditional firms, products and professions but also a growth of "pure" intellectual capital firms, products, markets and professions, and above all, a growing concern in many quarters with intellectual capital.[14]

11. Since 20 years allows for close to 3 doublings, the stock of knowledge at the end of the 20th year is close to 8 times as large as the initial stock. This simple calculation assumes that all new knowledge is both patentable and patented. Similar calculations could of course be done for technical know-how held as secrets, taking into account the rate by which they leak out (i.e. "expires").
12. de Solla Price has calculated that doubling times for scientific knowledge have been around 10 to 15 years for centuries (see Jantsch 1967). Scientific knowledge is not patentable in principle. However, assume for the sake of the argument that scientific knowledge with a doubling time of 10 years takes about a generation, say 20 years, to diffuse to a broader public, then only 25% will be publicly held at any point in time.
13. The Scandinavian insurance company Skandia is one good example, see Edvinsson and Malone (1997). See also Stewart (1997), and Kaplan and Norton (1996).
14. For the rise of intellectual capital based firms, see Granstrand (1998). For the increasing importance of technology markets, see e.g. Granstrand et al. (1992) and Geroski (1995). For the rise of markets for innovative, small firms, see Granstrand and Sjölander (1990) and Lindholm (1994).

The role of the intellectual property system

Let us first discuss how the intellectual property system affects technology and then how new technologies affect the evolution of intellectual capitalism.[15] Society's main rationale for having an intellectual property system is to stimulate innovations and their diffusion by offering prospects of protected products and markets, which sufficiently attract private investments in creative and innovative activities. Intellectual property rights (IPR) in form of patents, copyrights, trademarks, trade secrets, designs etc. are made transferable in principle through licensing to individuals and firms, which creates markets for all kinds of IPRs. IPRs held by individuals could also be sold or assigned to their employing organizations. Thus the IPR system provides the institutional framework for private property rights, markets and private profit in "intellectual products". In particular the patent system is set up to stimulate technological innovations and their diffusion. Thus, by design there is an impact of the intellectual property system upon technology, although it is debatable how large. In some industries, like drugs and chemicals, the impact on R&D investments could be substantial.

The IPR systems in advanced countries, USA in particular, have been considerably strengthened since the 1980s. Technology-based corporations consequently take patents much more seriously than in the past and employ various elaborate patenting behaviors and strategies. In addition, patents are complemented by other intellectual property rights in order to exploit the company's R&D and new technologies. At the same time as there is an increasing use of the IPR system, there is also an increasing abuse of it. For example, some inventors and small firms, especially those without vulnerable manufacturing, act as "patent extortionists", blocking manufacturing companies with their patents. Companies create "patent power" through strategic offensive patenting and the creation of patent portfolios. Companies also become increasingly technologically interdependent upon each other as products and services become more multi-technological, or "mul-tech" for short (which is different from becoming "hi-tech" in the sense of using some advanced, new technology, see Granstrand et al. 1992). Such interdependencies are also created by genericness of new technologies and by the need for external technology sourcing. Altogether progress may be hampered by the blocking power of a multitude of IPRs being dispersed among agents, if markets for IPRs (licensing etc.) do not function properly. Thus the IPR system may counteract its purpose. New technologies (like software and biotechnology) may also create misfits between technology and the legal framework designed to foster it. (See further Granstrand 1999b.) However, given rising R&D costs, abundant technology-based business opportunities, strong intellectual property regimes and improved technology and intellectual property management skills, there is after all little reason to believe that the trend of strengthened intellectual property rights, will be reversed, at least not in the short and medium run. One may also expect that various "fixes" of the IPR system will be initiated, rather than major overhauls (see Merges 1995 and Warshofsky 1994).

15. A more thorough discussion is provided in Granstrand (1999a).

The role of technology[16]

Role of new technologies in general

New technologies affect the evolution of intellectual capitalism in two ways. First they generate new intellectual resources and second they offer new means to private agents to extract rents from them. On both accounts infocom technologies are of particular importance. At a general level the supply of new business opportunities based on new technologies is thus crucial. Although some limits to new technological discoveries are definitely conceivable in the long run, there are certainly no signs of them for the foreseeable future. On the contrary, new advances of all sorts in various S&T fields are made at a high, perhaps accelerating pace. New advances in different fields of S&T also combine to produce still more new advances, and as long as technological opportunities multiply through some combinatorial mechanism their growth will be self-sustained.

In the advanced, industrialized parts of the world, the demand for new technologies shows no signs of decline either, and this is for several reasons. First, this demand is derived to some extent from the need to deal with various side-effects or consequences of earlier deployed technologies, e.g. the need for environmental protection. Thus, in this sense new technologies generate new demand, although usually with a lag. One can argue about the balance on the whole and claim (as Ellul 1990 does) that technology continues to create more problems than it can solve. However, even if new technologies on balance create more problems than they solve (which is hardly provable), it does not follow that effective demand for them will decline. As long as the costs and benefits of new technologies are unevenly distributed in society, which is likely to be the case, politically strong groups evolve as beneficiaries, supporting effective demand.

Second, to some extent new types of demands are created by the new technologies, e.g. demand for new types of information or audio-visual entertainment created by infocom technologies. More generally, as uncertainty grows with increasing complexity in society, the need for information will grow, especially when production and distribution of information create information asymmetries, which is the case under intellectual capitalism. Thus intellectual capitalism will reinforce itself (up to a point) with respect to production and distribution of information.[17]

Third, old types of demand persist, some of which are insatiable, e.g. in health care, security and life prolongation. Here new technologies are continually presenting new prospects. The need for "conspicuous consumption", to use Veblen's concept,[18] will persist and perhaps grow, e.g. in Japan and other *nouveaux riches* Asian countries.

Moreover, various demands, old and new, technology-derived or not, tend to be unsatisfiable by any particular set of new technologies. Improvements are attained, but they are seldom, if ever, ultimate solutions. True, some technologies come into dominance for long periods of time, yet not because they offer perfect solutions, but

16. A more elaborate analysis of the role of technology is given in Granstrand (1999b).
17. Note that in both Marx's and Schumpeter's analyses of capitalism in their days, they emphasized the auto-destructive character of capitalism on the whole in the long run, that is they argued that capitalism will destroy itself (but for different sets of reasons).
18. See Veblen (1965).

because it happens to take time to find better ones.[19] Sooner or later technological substitution sets in. On balance the rate of technological substitution seems to increase rather than decrease, as life cycles of new products and technologies tend to become shorter. Despite cases of technology persistence (Graham 1956), technology conservatism (Bohlin 1995), technology monopolies (Arthur 1988), dominant designs (Utterback 1994), technological interdependencies and lock-ins (Rosenberg 1994) etc., technology competition and technology substitution rule in the long run.

In summary, there is an apparently non-decreasing, long-run supply of technological opportunities as well as a persistent, effective demand for new technologies. The question then is if there will be possibilities to make private profits from investment in them and more specifically, how the opportunities and means to profit from innovation will be affected by the new technologies themselves.

First of all, innovations may become very profitable, even extremely profitable, but the profit distribution is very skew as witnessed by various studies (e.g. Scherer 1998), which implies deterring risks. The dispersion (spillover) of benefits and profits from innovation among various agents may further deter entrepreneurs from proper investments. The question is not so much whether imitators will free-ride innovations and reap large profits as well, but whether prospective innovators can trust their capabilities of making sufficient profits to justify their investments, compared to their alternative investment opportunities.

To have the capability to control the rent streams from the immaterial resources or intellectual capital deployed in the innovation and production process becomes a crucial consideration. One may argue that information cannot be owned.[20] Neither can humans be owned. However, ownership per se is not the primary issue. Rather, it is how private agents (firms, individuals) can control (manage) the rent streams derivable from immaterial resources and turn these streams into intellectual capital. In order to control resource rents, **excludability** is critical, that is, possibilities to lock in customers and/or lock out competitors. However, excludability is not once and for all statically given, but can be changed by new technologies. Especially infocom technologies offer new possibilities to raise excludability and also to lower transaction costs and thereby improve the functioning of markets, not the least information markets.

The role of infocom technologies

A main driving force behind the emergence of intellectual capitalism is technological change and the accumulation of new technologies in general. More specifically, the family of information and communication technologies, infocom technologies or ICTs for short, plays a pivotal role in the emergence of intellectual capitalism, not unlike the role played by the family of material and energy technologies in the emergence of original capitalism. ICTs not only enable fast, cheap and differentiated production and distribution of various old and new types of information, but ICTs also enable recording, codification, packaging and mass marketing of information, making it

19. An often quoted example is the QWERTY design of alphabetical keyboards; see David (1985) and Arthur (1988).
20. Many authors have made such arguments; see e.g. Thurow (1996). Also note the expression "information wants to be free".

commercially available at a low transaction cost. The traditional malfunctioning of pure information markets thereby becomes mitigated. Consequently human communication of valuable information, be it on a habitual, altruistic or barter basis, become more easily commercialized. Vast opportunities to profit from innovation and increasing competitive pressures at all levels in society will ensure that, in fact, information and communication will become far more subjected to commercial transactions than we have as yet expected, let alone hoped for.

A number of functionalities are offered by ICTs, and several key functionalities support intellectual capitalism. Increased collectability codifiability, connectivity, processability, interactivity, selectivity, and controllability in communications deserve special mentioning. These functionalities enable economic agents to profit from information, e.g. by raising excludability by building electronic locks and fences around information assets. Although we have an intellectual property rights system in place almost globally, ownership of information per se (including knowledge, competence and data) is not the decisive issue for intellectual capitalism as mentioned. Rather, it is the ability of economic agents to control the rent stream from information that is crucial. Such control has traditionally been accomplished by embedding information with physical products or with individuals, and more recently also by embedding it with small companies as well. Appropriation of benefits has then been accomplished by using product markets, labor markets or stock markets. ICTs now significantly enhance the possibilities to control rent streams from intellectual capital and products and raise excludability and lower transaction cost without necessarily relying on intellectual property rights, although the latter increasingly matters as well. Thereby, intellectual capital management, with technology management as an important part, becomes a key managerial issue in most companies, large and small. Old companies and organizations in general, like libraries and universities, will have to transform and adapt and new ones will appear such as data mining companies, information brokers and content providers. Similarly, intellectual capital oriented policies (for education, R&D, etc.) become of key governmental concern, especially in nations like Japan and South Korea, being poor in natural resources. However, by and large it is yet too early to fully identify all managerial and policy implications of the emerging intellectual capitalism.

Thus new technologies play two main roles for intellectual capitalism. First, they constitute a lion's share in the generation of intellectual capital and products and second, and more specifically for ICTs, they serve to privatize the benefits from intellectual capital and products by raising excludability and lowering transaction costs. The Internet with its web sides is a most important illustration of how ICTs play both these roles and thereby foster intellectual capitalism on two accounts. Internet provides a market place in the true, original sense of the word – a meeting place for prospective buyers and sellers, displaying merchandise and quoting prices with possibilities to communicate over prospective transactions. The market place provided by Internet and related networks is rapidly growing into an efficient, fast, global mass market with numerous information products and databases linked to it and with a concomitant rapid growth of electronic commerce in general. However, the fastest growth will probably be in information and multimedia related commerce, especially with new generations of Internet protocol

and digital payment systems enabling click and pay functions also for "microtransactions" of information on a large scale.

Summary and conclusions

Thus we may conclude that, by and large, new technologies are fostering the emergence of intellectual capitalism, while intellectual capitalism (a.o. through the IPR system) fosters the emergence of new technologies in a positive feedback loop (i.e. in a virtuous or vicious circle depending on political taste). New infocom technologies are especially important to this positive feedback in the techno-economic system in society. Such a link between new technology systems (i.e. families of interrelated technologies) and the emergence of new ways of organizing an economy, i.e. new economic systems, was also present in the rise of early capitalism in connection with industrialization. The new technologies of particular relevance to the first industrial revolution were new energy technologies, epitomized by the steam engine, and new material-processing technologies, epitomized by the loom and the mill (saw mill, steel mill etc.).[21]

In summary, this article has argued that we are witnessing a gradual evolution to intellectual capitalism, co-existing with traditional capitalism. Intellectual capitalism is characterized by intellectual capital being a dominant element in the economic institutions of capitalism (i.e. firms, markets, property rights etc.). Thus, we will witness the continued emergence of IC-intensive products, including pieces – large and small – of information being transacted, especially using infocom networks; the continued emergence of IC-markets, including technology markets; the continued emergence of IC-intensive firms, including "pure" IC firms; the continued cumulation and privatization of intellectual capital, including knowledge; and the continued private exploitation of intellectual resources through control of them and their rent streams rather than through strict ownership. New technologies, especially new infocom technologies, are constituting a major factor among several interdependent factors behind the transition. Other important factors, not specifically dealt with in this paper, are intensified international competition; rise of large MNCs; managerial developments; rise of countries like Japan, being poor in natural resources; US political activism; and experimental developments of institutions.

Finally, what about any self-destructive or stagnating tendencies in intellectual capitalism? What about issues of past concern in capitalism – capital concentration, obsolescence of the entrepreneurial function etc. These are all pending questions for the future. Certainly, many past concerns over effects of capitalism apply to intellectual capitalism as well, such as concern over capital concentration, inequalities and unemployment, all of which may be aggravated in intellectual capitalism. Unemployment in certain types of more intellectual capital oriented professions may also gradually become substantial. Some new concerns over intellectual capitalism are also likely to appear. A most probable example is economic crime, or intellectual capital theft and fraud in and among developed and

21. See Freeman et al. (1982) for a good overview of attempts to link «Kondratieff waves» of new technology systems to fundamental changes in the economic system or changes in the «techno-economic paradigm» in the words of Freeman and Perez.

developing countries. Infocom technologies may actually offer attractive crime opportunities because of expensive policing and law enforcement. In fact, there will be substantial difficulties in providing proper legislation in time.

Various types of transaction costs could also become exceedingly high in intellectual capitalism. On the other hand, infocom technologies might also offer new opportunities to lower them, but probably at the cost of increased societal control and perceived losses of personal integrity and freedom. Thus, intellectual capitalism may clash with at least one set of fundamental human values.

Regarding the future of capitalism altogether, various authors (e.g. Marx, Schumpeter, Drucker, Thurow, Rosenberg) have emphasized different self-destructive, evolutionary or stagnating tendencies inherent in capitalism. Regarding the future of intellectual capitalism it is probably not overly technocentric to assume that new families of technologies will appear that will again fundamentally change the economic system, gradually or not. For example, a new technology family or technology system is emerging in and around biotechnology and health care, what we perhaps can call biohealth technologies. It is not inconceivable that intellectual capitalism will increasingly be perceived in society to clash with fundamental humanistic values, in connection with biohealth technologies. Such clashes may very well spur the emergence of new types of economic systems, be they capitalist, quasi-capitalist or something else, yet to be identified.

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