The New SCI Wave

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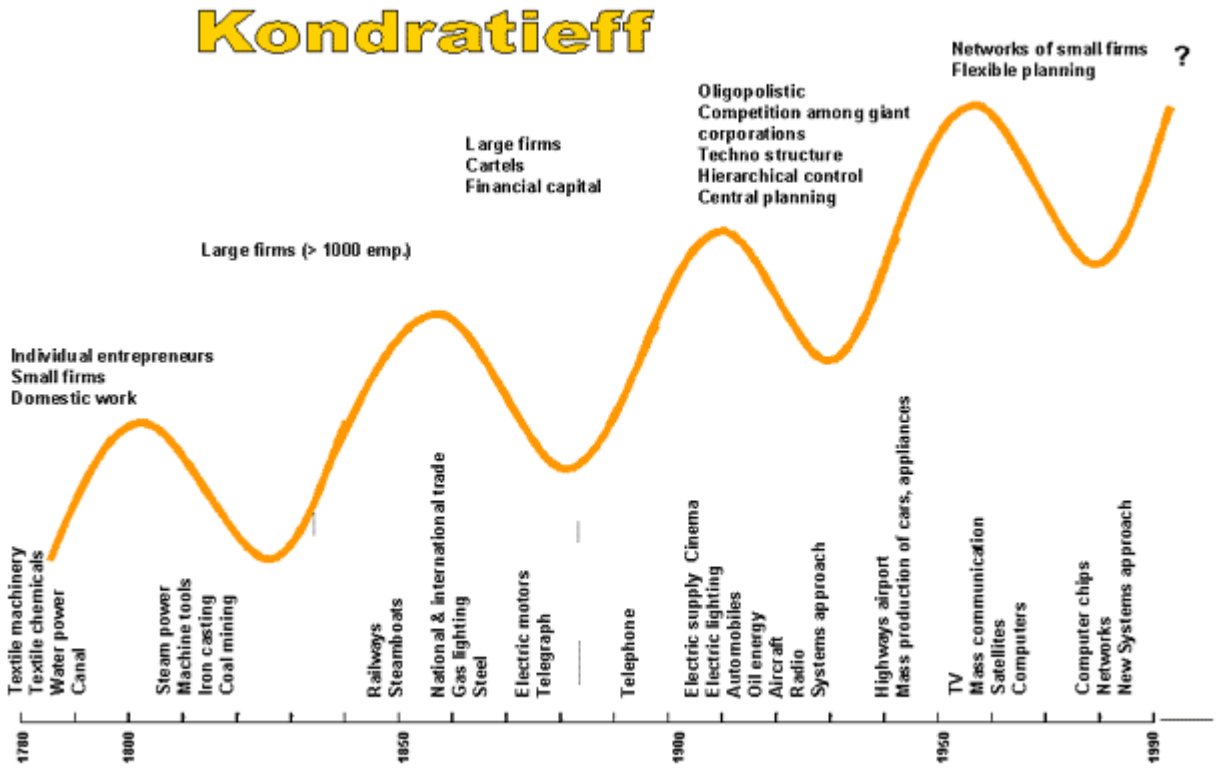
ABSTRACT

An inquire about the future of SCI is attempted based in the ideas of technological waves and the metaphor of SCI as a virtual city. Technological waves are periods of economic boom and decay that span through some decades, arising from a clustering of a few mutually reinforcing technologies that permeates all socioeconomic activities. The steam engines, railways, steamboats and iron production cluster in the last century (1830-1880) is an example. The cluster produces a sustained economic growth and afterwards enters a stage of diminishing returns and crisis during which the old technologies are severely selected and the new technologies for the next boom are generated. The hypothesis in this work is that the next wave will be based on informatics, cybernetics and new developments in system theory. According to this idea, a discussion on actual and near future diffusions and impacts of these technologies in the economic and social system is presented. The affected subsystems are the production and trade of goods and services, the information market, the teaching and learning activities, the political procedures, the physical and ecological environment, and many aspects of social behavior. All these aspects will become related and integrated and will lead to the emergence of an informatic supersystem (a sort of Popper´s world III) bringing opportunities, dangers and different spaces for all human intellectual activities, influencing many aspects of human life. The analogy of this space with a city or a nation is used as a descriptive and heuristic metaphor to characterize actual possibilities and explore new ones. Emerging problems are discussed: access to the cybernetic world, complexity, structural changes, learning, organization and legal issues, hindrances caused by old attitudes and institutions and new problems posed by the new society. The impact of these problems on some integrative techniques and methodologies, such as informatic webs, database building and management, systems simulation, statistics and system theory are briefly discussed.

The development and impact of the different aspects of the transformation depends on the different types of societies compatible with the new wave. These types will also be affected by the wave itself. Three types of society are considered: a free, open, equal opportunity society in which the participation of the individual in the new world depends on his or her free activity; an apartheid society, with privileged groups monopolizing access to the new opportunities; an organic society, in which the access and use depend on pre-assigned roles to the individuals in an organized whole. Finally the importance of these types of inquire is stressed.

Keywords: Technological waves, Informatic society, Social change, Structural change, Web cities.

1. TECHNOLOGICAL WAVES



The world is entering a new technological era. Similar situations have happened in the past history of the industrial society. Existence of cycles of emergency and decline of technological eras or waves was pointed out by the soviet economist Kondratieff [10]. Other scholars (Schumpeter, [19], Freeman and Perez, [6]) have given explanation of these long waves; each wave is about fifty years long, starting from 1785. These waves are formed in industrial countries but they haul, each time more strongly, the whole world economy. A wave starts with the development of a few mutually reinforcing new technologies, creating a positive feed-back process that produces a boom. The new development permeates all the economic and institutional system. New enterprises are born, new ideas are applied to old activities, new professions appear. Enterprises and government activities change according to the new opportunities and problems. After two or three decades, the boom reaches its peak. The leading technologies applications and the new developments become exhausted, the capitals invested in them and in related business diminish their returns by competition and lack of new markets. The boom slows down, recession proceeds and a crisis follows. New types of business and new technologies are desperately looked for. Slowly, a new cluster of mutually reinforcing interconnected technologies emerges, some business based on the old technologies disappear, but many others, usually transformed, remain as support or auxiliary elements of the new ones. Capital and work resources move to the new fields. A new wave emerges.

Each wave is characterized by a particular structure of enterprises, new capital-labor-government relations, a specific style of life, and the development of certain branches of science. Let us mention the four historical waves with special references to the last one. The dates are, of course, only approximate.

1785-1835: Textile machinery, iron casting, water power. Domestic distributed work or small industries. Crisis of absolutism and feudal relationships. Democratic revolutions in Europe and America. Mechanics.

1835-1885: Steam power and transportation. Railways and steamships. Machine tools. Large national and international trade. Gas lighting. Coal mining. Enterprises with a few thousand workers and small administrative staff. Trade unions. Liberal governments. National democratic revolutions. Mechanics, Thermodynamics, Inorganic Chemistry.

1885-1935: Steel production. Electric power and lighting. Telegraph and telephone. Large enterprises and financial institutions. Strong trade unions and socialist parties. Widespread literacy and newspapers. Governments promotion of international trade. Some mass based totalitarian governments. Imperialist politics, colonialism and wars. Physical, Chemistry, Electromagnetism.

1935-1985: Mass commodities production. Automobiles, aircraft, airports, highways. Domestic appliances. Radio, cinema and TV. Boom of oil production and high energy consuming production: cement, plastics, metals, chemicals, petrochemicals, fertilizers. Atomic energy. Giant, vertically integrated, transnational, hierarchically managed enterprises; technostructure. Advertising to control demand. Keynessian policies of high public expenditure (weapons, social services, infrastructure) to maintain aggregate demand. Rise and fall of totalitarian regimes. End of colonialism. World integrated trade and flow of capitals. One-directional mass communications media. Early informatics, spatial, biological, services, and educational technologies as harbingers of the next wave. Electricity, Electronics, Organic Chemistry, Solid State and Nuclear Physics, Biology, Biochemistry, Systems Approach, Logic and Operations Research.

1985-? : Global informatic wave.

2. THE GLOBAL INFORMATIC WAVE PROPAGATION

In this work we will try to explore, based in early symptoms and analogies with the past, the impacts and changes that may produce the new technologic wave in the whole society.

The key technologies are computers (all categories of hardware and software); the global informatic network based on satellite, optic fiber or wireless communications; a variety of special purpose chips to insert in any type of devices to sense and storage information and for controlling device function; general purpose programmable robots, with environment recognition, objects handling, reactive and learning capabilities; mobile, satellite or wireless telephony with information storage and processing capabilities. All these elements are opening the availability, spreading, analysis, processing and use of all kind of information to an extent never dreamed before. This new wave will have strong impact on the following environments:

a) Enterprises.

Robotized -computer controlled- production-may get rid manufacturing of rigid and slow assembly lines, allowing a client driven, asynchronous production of variable and personalized items. Most of the demand may enter via Internet. It will be automatically sorted and analyzed and, perhaps after some interactive adjustment with the client, it will be the input of the productive process (Portnoff, [17]). This would eliminate costly, cumbersome

and inaccurate central production planning, based in dubious, bottom-up, compressed information. It may also save a great deal of marketing research and inventory. In the internal organization the classical hierarchical flow of information: bottom-up increasingly compressed (and almost always distorted) information, followed by analysis done by over-busy high managers that produce top-down directives, may be substituted by a decentralized network of information organized in a self regulated systems in which each message will go from the place where it is produced to the places where it is needed, to maintain a smooth, demand adapted flow of production and selling. Innovations may be consulted, and perhaps suggested, by clients. Many suggested innovations can be outsourced to specialized research enterprises to be implemented. Enterprises would have the same driving relation with their suppliers. The productive system will probably become a loose network of rather small enterprises instead of an oligopoly of big ones. In a further development it is conceivable that investment will be controlled by the stock market and it, in turn, be influenced by available information from the enterprise and the clients. Many problems of security and privacy must be solved before, but it is very likely that the secret that is now associated with the operation of enterprises will be considerably relaxed, to the benefit of consumers and investors. As the informatic environment will make unavoidable continuous information leakage, the enterprises will understand that a sincere mutual disclosure of many practices and projects may not be harmful. Of course, patent rights must be maintained, not too weak, to award creativity, and not too strong as to inhibit continuous research and to block the diffusion of innovations. The physical transport of people for production purposes may be reduced to a minimum with savings in energy an environment damage.

b) Owners, managers, employees, clients relations.

One possible tendency of the informatic society is the strengthening of the power of clients and owners of the capital and a weakening of the power of managers and employees. It must be remembered that the mentioned labels are roles, not person designers or social classes. An employee in a free society is necessary a client and will be almost always an investor. As it was pointed out above, production may be controlled more and more by clients and investment by stockholders that, due to the access to all types of information, may gradually bypass or control the current intermediaries of investment: the financial system and stock exchange agents. The actual imbalance in the number of messages, almost all proceeding from sellers to customers, may be surely reversed as more and more clients would express their needs in banks of classified advertising that the agents of sellers may explore. On the other hand, unqualified work will be robotized and many managerial tasks will be assumed by investors and clients control. This transition has many dangers and traps that must be discussed below.

c) Government.

As a government task is the care of the public property, the information given about government activity should be complete. The right to be informed could be considered a fundamental one. Constituencies will probably demand full access to the data and information bases of their local and central governments, and the governments might organize their information to facilitate the access, understanding and interpretation. The citizen could get information about a new traffic or tax regulation, or about the actual stage and expenditures in the building of a new highway. Legal codes, with comments for the exact interpretation must be in the web. The legalized curricula of all the elected people and main public employees might also be available. The facility to make referenda will surely be exploited. Actual legislation and tenure of public positions might be continually rectified by a well informed constituency. This complete information about government activities must not

be taken for granted as a consequence of the informatic wave but they will become a real possibility. On the other hand, the new technologies open many possibilities for the government. It can develop a self controlled system similar to that mentioned for the enterprises but it can also develop accurate files of the activities, property and habits of the citizens.

As citizens of an underdeveloped country -an atypical one indeed- the authors believe that whereas this panorama seems likely to industrial developed countries, the same it is not warranted to underdeveloped countries. As with the past waves, this new wave may open an opportunity for these countries to jump into development (Perez, [15]) but also to remain even more apart of it. Non democratic governments in underdeveloped countries may try to centralize information access, may try to difficult or even forbid global communications and may use their power to control people instead of letting people control them. However, the global satellite communication with the universal network may be a serious difficulty for such kind of governments.

A related problem is the contradiction arising between the national states and the universal Internet community. This will be discussed in section 3 and 4.

d) Home.

New technologies are developing that will enable many appliances and gadgets to be computerized allowing them for a great variety of behavior. The situation has some similarities with the use of electric motors in the 3 and 4 Kondratieff cycles. At the beginning, electric motors were sold to add them to existing devices that were moved by hand or steam. Afterwards, they were embodied in the devices. Similarly special purpose computers will be integrate in many domestic appliances. They may be controlled by a central general purpose computer and even through the Internet. It has been suggested that the seller may update the software in the appliance to upgrade it or to adapt it to a new user requirement (Levy, [11]). Or instructions can be sent to the user for small reparations or to specify particularities of the use. The appliances may emit messages and warnings to they owners. A refrigerator may announce a possible future failure or the deficit of milk in a carton package, or may directly order a new one. Many daily activities of the members of the family will be done at home. Banking operations: money transfers, payments and investment; orders of any kind of goods and services, information requests about any subject of cultural, entertainment, consumption, health, ecological or business interest, personal communications for any purpose, and a lot of productive work may be done through the personal computer or special computerized devices. As new information oriented jobs will appear and old activities will increase more and more their information content, working at home will increase with gains in safety, commodity and energy saving. It is obvious that home Internet services may be extended and complemented by public services as in the current telephone and mail services.

e) Education.

The impact in education is twofold: massive education will be needed to catch up with the new, rather abstract ideas behind the technology, and the methods of education must change radically by the new opportunities that the informatics will bring forth. The first aspect is fundamental, specially if the need of participation of the whole society in the new wave is recognized. Up to the moment the attempts to solve this problem have not been very successful. Almost all users have difficulties with personal computers that are the central devices for the revolution. User's manuals are usually long, of poor quality and to learn through them takes a lot of time, while the computer is supposed to be used to save time to

people very busy in their own businesses. Primers are not enough to master the systems and helps are frequently of not help at all. It is clear that software producers, in their scramble to gain users, have had not always time to design an adequate didactic support for the systems they sell, pushing the people with fine promises and demos and finally transforming them in dependents of friends, relatives or paid advisers that have a little more experience. In the name of the success of the new wave and the honesty of the business software, producers have to take the responsibility to instruct the client or at least to give them a real estimation of the effort that implies to become an efficient user. It is not claim here to indicate the solution of this difficult problem, but it is possible to give some conditions that must fulfill an instructive system:

- **It must be situation-oriented, given the right advice in each difficulty.**
- **It must be "isocentered" in the sense that the user can reach the whole instruction starting from any particular point (usually related with her or his immediate interest) and following a "learn by using" process. This can be done adding to each specific help a bit of a more general insight in the problem. Tutorials, using the classical hierarchically ordered teaching, must be reduced to a very short general introduction illustrated by meaningful examples.**
- **It must reduce the written stuff and use voice and graphics (avoiding hieroglyphic icons).**
- **It must avoid to burden the user with menus (that may distract the user with alternatives not always relevant or self explained) and must concentrate in interpreting natural language commands of the user.**
- **It must have an immediate and easy way to send complaints or suggestions to the responsible of the teaching.**

The impact of informatics on teaching and education has been widely discussed . The classical way of teaching, including programmed learning is available in the Web and CD's. Complete courses are offered by universities and other educational institutions. The success of these efforts can not be neglected. There are however many problems. The new possibilities has not been used in all educational institutions and are almost ignored in developing countries. This may be solved by governments, private educational institutions and the new generation of teachers.

Other limitation is the lack of general application of more interactive methods between teachers and students and among students. More sophisticate methods that emphasize the participation of the student (as learning by discovery) are seldom used. Another problem is the loss of the human relationship in the teaching process. Professors, teaching authorities and peers are examples and models (good or bad) for the students at an age in which models and behavioral patterns are needed, compared, rejected or adopted. This shortcoming of informatics teaching can only be balanced by special personal communication sessions, that can concentrate in interpersonal relations and social behavior (group dynamics, artistic collective performance, spiritual insights, sports and entertaining). But all that does not emerge as a need of the new wave. The problem with informatic personal development is that it may allow the building of closed communities, because the universal communication is possible but not necessary and can be easily avoided. See below for a consideration of these issues.

f) Information handling techniques.

It is clear that classic information handling techniques: information storage and retrieval, statistics, operation research, mathematical models and computer programming will be

transformed and developed to cope with the new wave.

Information storage and retrieval is yet being developed into data base and knowledge base techniques associated with sophisticated search and inference procedures based in logic and semantic methods. Search methods in the Web has been developed by simulating explorer agents with learning and pattern recognition capabilities. All these methods has been tried but they yet need further improvement and sophistication.

In Statistics, the look for patterns in samples from large populations data has been impacted by highly computer intensive methods as bootstrap and neural nets, while the classic methods of data analysis has been enhanced by graphical presentation. Neural nets can be used in time series and multivariate analysis. Maximum entropy and bayesian methods may benefit from the high computing capabilities. The widespread of decision situations in trade and investment, to which the flexible economic system will lead, will produce new efforts in decision theory, sequential and bayesian statistics. The richness and quantity of accumulated data will stimulate the use of data mining and other exploratory techniques.

In operations research non linear optimization may be approached by genetic algorithms and other computing intensive random technique that may avoid to be trapped in sub-optimal values. Simulation techniques are being used more and more in all scientific and technical fields in the limited form of system dynamics simulation, while discrete event simulation has not changed too much and could not yet benefit from the new mathematical theory in this field. The main challenge is to handle very large scale models and structural changes.

Computer programming is the central technique for the new wave. After the emerging of assemblers and compilers the main novelties have been structured and object oriented programming and the specialization of oriented programs for simulation, database, statistics, mathematics, graphic design, sound processing and table handling (worksheets). However, programming is yet difficult to teach and error free codes difficult to construct. Mastery of specialized packages, as it was pointed out, requires a lot of time. The same is true for general purpose programming that must be part of the future curriculum of low level education.

g) The new system approach: changing complexity.

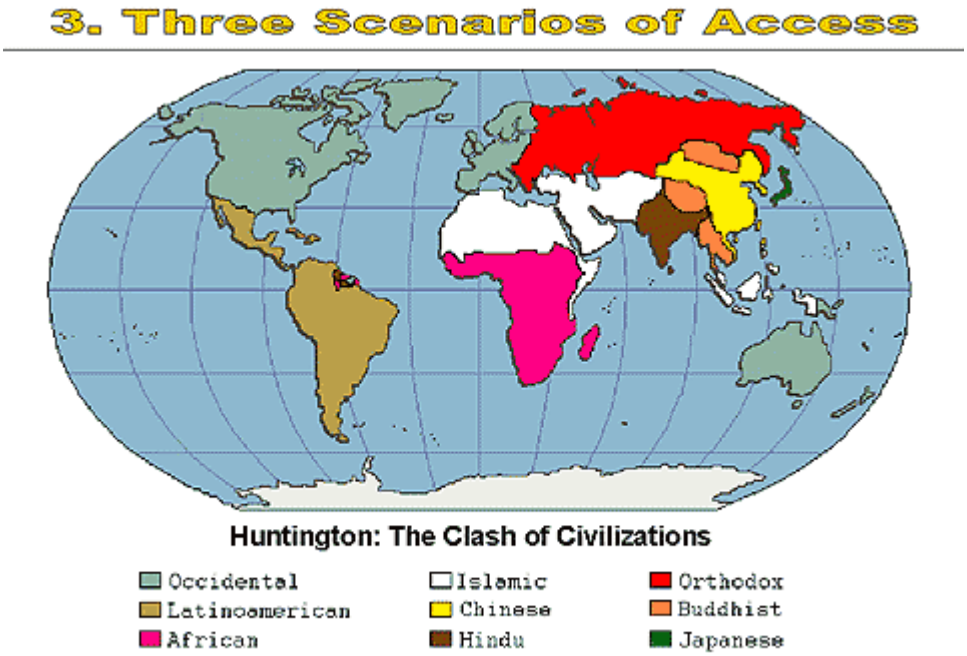
The system approach was developed in the 4 Kondratieff to handle the complexity of hierarchically organized large enterprises and institutions. Since the crisis of this wave started in the seventies, the world entered the turbulent times of changing complexity. However a set of ideas and techniques equivalent to the system approach for complexity has not been developed for this new situation. In structural change, as opposed to the mere change in the values of the properties, some elements are added to the system or eliminated of it, the relationships among the elements and with the environment change, new properties appear or disappear and the laws of behavior change drastically. Structural and agent oriented simulation (Domingo, [2, 4], Oren, [13], Zeigler, [23]). and scenario techniques (Wack, [21]) has been proposed to treat special problems and many particular studies has been done in economy (Passinetti, [14]) and organization theory (Noer, [12]). Some attempts has been made to deal with the general problem of the structure formation and change. One of them, leaded by the group of Santa Fe is based in Von Neumann [20] ideas about automata, that is to say, to study the properties of systems formed by a set of relatively simple individuals (automata) that may display very complex behavior that allow them to associate in complex structures. The simulations are called artificial life, artificial societies, artificial economies, according to the structures they try to mimic. When the simulations

display properties similar to those of the real systems, the mechanisms of the building and transformations of these systems may be grasped. An important result is that certain parameters of the system are crucial in structural change. If the parameters are continuously changed (which may be induced by changes in the environment) the system may pass from stable, to oscillatory and then to chaotic behavior. However, at the edge of chaotic behavior, there is a region in parameter space in which structures are formed, stable enough to maintain a distinguishable structure, and unstable enough to evolve and adapt by a selection process. This processes of "adaptation at the edge of chaos" would explain the main mechanism of structural evolution (Kauffman, [9]). Other approach to the problem is to observe and classify the existing types of structural changes given by the rich historical, philosophical, religious, scientific and technical tradition and to study the connections among the different types, trying to arrive to a general theory that allow to detect, analyze and manage structural change situations (Domingo, [2]) . Other authors have stressed the relation of structure formation with the thermodynamics of irreversible processes (Prigogin, [18]). Of course a synthesis of all these approaches must be necessary to develop a useful theory.

h) The human sciences.

The new relations among people must rebirth the interest for Sociology and Psychology. Utility theory, altruism, agreement analysis, collective decisions, collaboration and trust (Prisoner's dilemma), have to be discussed and practical solutions must be reached to cope with the problems of a society whose foundation will be more and more a high rate of communication and information flow.

3. THREE SOCIAL SCENARIOS



What is the possible society corresponding to the informatic wave? The technology does not determine, by itself, the social structure. It rather opens new possibilities and favors some alternatives more than others. Each wave has given some new characteristics to the

socioeconomic and political system. Is the informatic wave merely another wave that will culminate, decline and pass away? Or, at least, the permanent footprints that all waves have left, will be more important in the case of the informatic wave? There are many reasons to believe that this wave may produce fundamental changes.

Since the labor division split the primitive society into controllers and doers, the unbalance of information has created a hierarchical social system (Domingo, [3]). The large disparity in wealth and power that can easily be measured in an ordinal scale, does not corresponds to the differences in incommensurable characteristics as intelligence, imagination, abilities, sociability and character that make each human being a unique individual. Those disparities are maintained mainly by disparities in information, and these can be maintained by the difficulty of diffusion and the facility of exclusive possession. In the early stages of social development this exclusivity was based in the mere inaccessibility of the subjective world, while the emergent methods or diffusion (language, symbols) helped to create society. This contradiction, between the biological inherited isolation and selfish and the evolutionarily created communication and collaboration, developed as society became more complex and built up new methods of diffusion and secrecy. The blows against secrecy have formed part of many violent revolutions, but the material conditions managed by the triumphant reactionaries or revolutionaries have allowed the rebuild of the information barriers. But, at last, the actual technological global wave seems to affect drastically the information diffusion. Because the horizontal, upwards and downwards possibilities of the information flow, all information barriers may become in danger. The trend towards a non-hierarchical society has become, if not necessary, at least possible. On the other hand, new barriers and controls has been built and will be built in the future. The new society will depend on the particular assembly of these two processes. Many types of societies are possible. Here three main general types are considered. Of course, these models do not exhaust all possibilities and mixed models are also possible. It is also likely that different models could coexist at the same time in different countries in spite of the globalizing tendencies of the informatic wave.

a) The economic apartheid society. Participation in the information world will be expensive and the possibility of access will be strictly proportional to the income of people. Access to information will make wealthy people more rich and lack of access may impoverish the poor. Opportunities to get the education to climb the information ladder will be strongly biased by different initial economic conditions, and no pedagogical efforts will be done to make the information accessible to people of low cultural level. The people at the top of the economic structure tends to cling to their organization and productions methods and this rigidity difficult the innovations, giving rise to technological cycles. Novelties find their way at last, against traditions, monopolies and big enterprises, but it may be a costly , long process. As all discriminative societies, internal conflicts among groups will be permanent and may adopt special forms in the informatics society. Strong governments could be instaled with the task of repressing the aggressions of the poor or, conversely, with the claim to protect them from exploitation and unemployment. This may lead to the next scenario.

b) The organic society. Governments will control the information flow with the arguments of social safety, to repress aggressions produced by the apartheid model or to protect the economically discriminated by it. The information access will be graduated according to the function of the individuals in an organized society. A hierarchical tree of information keys will be the image of the social organization. This organic society is still more rigid than the apartheid society, since it discourages private initiative and generated an uncontrolled bureaucracy. The legitimacy of strong governments lies in the existence of social conflicts and disagreements in the society, as political scientists have observed since long ago (Hobbes, [8]). It is clear that governments are always more interested in being mediators in conflicts than in organizing a society in which conflicts were solved by the interactions of the parts,

making government powers almost always unnecessary.

c) The open society. In this society the access to the information network would be considered a basic human right, like the elementary education and health services in the developed countries. All information about public property may be accessible and free as was said in 2b above. Relevant information about profit and nonprofit organizations, necessary to guide private investment will also be free. The access to general education, legal, environmental, and health care information, would be free and easy to understand. Some restrictions as temporary monopoly of patented ideas would be allowed and regimented. It is assumed that a lot of information services will be paid (as now happens) by private enterprises as part of their advertising and services to the clients. As education and information diffuse horizontally in the whole society and consequently the actions of information monopolies, vicarious decision makers (managers and politicians) may be reduced to a minimum, it may be possible a flexible self regulated society in which each citizen will carry out the triple role of employee, consumer and investor, balancing them according to her or his projects and expectations. The collective problems might be solved by referenda, agreements and contracts of the involved groups. Economic structure and government may cease to be the frameworks in which individuals live and their functions might become the result of the free and self-coordinated activities of the individuals and institutions. It may be noted that the free flow of information, the continuous revision of the feed-back relations among the individuals and institutions and the flexible adoption of new technologies may be the end of rigid structures, violent structural changes and technological cycles. The global informatic wave, as it may affect the roots of the hierarchical society and its rigidities, may mark the end of the technological waves.

Hierarchical systems may be substituted by isocentered systems in which each individual may feel at the center of the society.

Finally we note that this development might lead to a weakening of the national states, which may help to solve the economic, politic and ecological problems caused by an arbitrary division in nations and may promote the formation of an "international civil society" (Porta and Scazzieri, [16])

4. WEBCITIES

Let us take the concept of Geocities [7] to extrapolate a model of what could be the Internet world in an open society in the near future: a high intellectual, mental world constituted by interconnected webcities in a virtual space parallel to the real physical world of interconnected cities and countries in the geographical space.

Great civilizations in ancient past raised in and as result of the process of human interchange of products, knowledge, technology, believes, customs. Every interchange implies transportation either of persons or materials and therefore, it is time and effort consuming. Geographical and cultural circumstances have conditioned the ways of living and interchange relations among humans. On one hand, weight, distance and time difficult interchanges but on the other hand, the need and volition to overcome them have driven humans to develop technology. Fierce, and more often than not, cruel competence for natural resources, technology and labor force have plagued history in the past and even at present, thought moderated by international agreements when possible. Differences in wealth, race, knowledge, believes also have confronted humans for ever. Fear and the need to protect lives and properties have been the counterpart of aggressive behavior that altogether have boosted arms technology and security systems.

The new informatics and communicational technologies for the first time in history open for humans the opportunity of performing a great deal of interchange without the need of transportation for themselves or for cargo. Now it is possible for many of us to live part of our lives in webcities: works like programming or design in many fields, learn, publish, recreation, participation in discussions, referenda or elections, chat with people, shopping. More and more people around the world will join this kind of life, we hope. Unfortunately, unwanted offensive or deleterious interchanges are still possible, so security and protective protocols are also needed in webcities.

We, as many others, observe that almost naturally many web sites are been organized like cities or like malls, specially commercial sites, Internet providers and web Portals. Geocities has the merit of creating a concept fully based in the city metaphor, including the existence of individual citizens or "homesteaders" living in "Neighborhoods". What we think is that this metaphor will go further and it will mean a new leap for humanity as important as Athena was in ancient Greece. We think that along side with the coming era of "pervasive computing" animating all kind of domestic and office devices, there will persist the concept of "personal computer" –regardless brands or operating systems- as an almost natural extension of human intelligence. In webcities all of us as citizens living in our home computers -playing both as clients and servers- can be alternatively consumers, producers or investors, altogether taking interchange to levels and speeds never possible before.

Life activities can now be neatly split into physical and intellectual activities. Practical, common sense and health considerations must determine which activities are better performed in either way or in mixed way. For example, it does not make much sense to play golf in a simulated field in a computer as it is not real golf but it does make sense to play chess. Good common sense to distinguish is crucial, specially for children life in webcities. For people interacting in webcities probably always must come the time to send the message: Should we meet ?

Next let us present some ideas on the forms some life activities could take place in webcities.

a) Residence

Geocities now houses personal web pages for free or small payments in case of users that demand more resources over the standard offer. Webcities may house personal web pages –web homes- in several modalities including the cases of housing only links –entrances- to personal servers that actually have the content besides all the interaction capabilities of servers under citizens control. Residents or citizens may pay taxes and conform to the city regulations. In return they will obtain a variety of city services: directories and maps

including references to their homes, classified ads to help searching for services, products and persons satisfying given characteristics; public libraries with all type of texts and media, museums, concerts, entertainment, malls housing all type of stores, banks, community help as in Geocities, telemedicine and all type of consulting and advisory services from love affairs to computer simulation [5], magazines and newspapers, educational programs, schools, universities, public plazas to favor random contacts with other people, tours all over the world to meet new people and cultures, interviews and guided tours with executives, scientists, technicians, politicians. Part or all of services may be offered by the citizens themselves creating new forms of human interchange. Web currency may even exist to compare the relative values of interchanges.

Webcities may compete on the quality of services offered to citizens, on levels of participation of them in establishing city laws and rules, on balance between freedom and security.

b) Security and privacy

How to protect servers and clients of unauthorized access as well as how to ban access to non proper sites for children is a big problem still not completely solved in the Internet world.

Cities in Internet build walls like ancient cities had to protect citizens and control access to visitors. [22].

A recent invention based on the discovery that the iris of the eyes have patterns that are characteristic and unique to each person could bring a solution to many security problems [1]. The system has already been tested in automatic teller machines to identify clients and their accounts. It may be included in PC´s and other web devices to be activated when identification is required. In webcities citizens may be identified by their iris patterns. After that, they will have access granted to all available places and services except restrictions that could be stated by law, to children for instance. Visitors may be required by city law to record their iris identification at entrance to some places of delicate content, for example, on entrance to a place where instructions on bomb assembling are given.

c) Education

Webcities may house formal or informal educational sites. There could be associations between real and web schools and universities to offer the "best of both worlds" to students, specially for children and young people.

5. CONCLUSIONS

The forthcoming global informatic wave will have a far reaching impact on the economic, social and political structure of the world. The outcome cannot be predicted, but the increase in horizontal communications, the tendency to overcome institutional and national barriers and the new spaces created by Webcities, indicate a possible increase in individual freedom, balanced, in cases of interest collisions, by direct agreements by the parts involved. The general trend of the transformation process will depend on the coordination of daily decisions with the general situation of the evolving wave. It is very important to be conscious of this situation to foresee the open opportunities and dangers and the impact of each decision. So, the systemic studies about the complexity and structural changes of the global process will become increasingly important.

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