

## ICT and the new urban development.

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- ***the super-functionalized and space-specialised city***: the sectoralisation of the modernistic city plan that have divided the city space into 'efficient' mono-functional zones (where to work, to shop, to live) - with the citizens hurrying as aliens between zones - can still be increased by the intervention of the new ICT (see the concentration of services in teleports zones).
- ***the virtual-space home-centred city***: thanks to the new ICT a super-functional home can be imagined as the place where the individual can stay to perform all the functions (telework, teleshopping, telebank, teleschool, teleplaying) with no need to move others than for leisure.

The *scenario for a human-centred city* could refer to a revisiting of the city of the past where the urban space where organised - at the fine local scale of the quarters - to allow a complex mix of activities and functions. Individuals interacted easily in an informal ways in the streets and piazzas. We refer to this scenario as that of an *agora* city. The space organisation should in any case favour the natural needs for socialisation of the human being, favouring solidarity and social cohesion, while the technological options should permit to regain the efficiency of the city 'machine'. To revisit the urban plan one can focus on four main functions: shelter, education, work, leisure.

## ICT AND THE NEW URBAN DEVELOPMENT

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### 1. INTRODUCTION

The increasing difficulties to live and govern the city are dramatically evident in large urban agglomerates. An 'urban malaise' diffuses even to cities with a more manageable size. What the reasons? can ICT be of help? The increased density is at the base of many of the symptoms. One has reached saturation of the limited capacity of urban systems . From the viewpoint of the *organization and use of the urban space* an excessive specialization and functionalization is evident. This has made less efficient to use the city services and to live and work in it. Furthermore, there is an increased interference of the external space organization (through the development of global networks) on the city. The space has become multidimensional with different *metrics* according to the variable looked at: physically faraway points can become very close, while close ones can be felt as faraway. The citizens feel an increasing dis-harmony with the urban space.

Look at the city *as a privileged space for economic activity*. A decrease in efficiency is evident. Economic activity which in the past produced 'positive' externalities have now turned to the opposite, producing 'negative' externalities. The 'individuality' of the city as a centre for economic wealth production is losing ground to the new phenomena of globalization with an increased volatility of production factors.

From the viewpoint of *the multifaced social process* that develop in it, one sees a decreasing ability to govern the process. Everithing is interacting with everithing else and it becomes difficult to efficiently manage the city systems.

The willingness to react are increasing and new concepts are emerging:

- 'agora'city - human centred with an harmonic relationship between the citizen and the urban space, less social segregation and more solidarity.
- 'glocal' city (global/local) - with a better balance between the volatility of production factors by globalization and the local resources and diversity.
- 'sustainable' city - that can assure a stable future capable to internalize problems, solving instead of transferring them to future generations.

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Can technology help to respond? Has not technology itself contributed to produce the present undesirable situations? ICT, is not free from this concern. Its development can push towards more specialization of urban space, increased separation between the *haves* and the *haves-not*. But not necessarily. Technology is not per se biased in favour of one objective better than others. To take advantage of technology depends on our ability to define clear objectives to be met. Technology opportunities have to be understood in terms of objectives to be reachable. This might be particularly difficult for new technologies such as ICT whose full potential of applications has yet to be grasped. We need visions on the alternative futures possible by the use of technology.

## 2. ICT BUILDING BLOCKS FOR NEW CITY SCENARIOS

A lot has been said about the potential of the new ICT on the human way of life. Existing applications are however still very far from exploiting its potentiality. The building blocks for the future of the city can however be identified:

- **Telecommunication infrastructures** such as: broadband broadcasts / two ways TLC/ TLC highways/ teleports/ cabled city/ mobile terminals
- **TLC services** such as :VAN (value added) services (videotex, etc.) / computer networks services / electronic mail / health care application / distant learning / multimedia TLC / utilities networks management aids
- **intelligent buildings and homes:** domotique/ shared ICT facility centres / community teleservice centres / media resources centres
- **city system process control:** traffic control/ air monitoring/ communication and interaction with urban service users/ utilities networks management.

Effects of applying some of the building blocks are already visible. The first type of impact is that of '*networking*' the space, by somehow de-materializing the space, and changing interpersonal relationship (from one-to one connections to: more-to-one/ one-to-more/ more-to-more). The second type of impact is to multiply the intrinsic communication ability of the individue: TLC is providing a kind of *communication 'aura'* around the person (the effect is particularly clear with the mobile telephone). The third type of impact is that of improving the ability to *govern the complex subsystems* that compose a city.

For the **networking** effect:

- *telecommunication infrastructures* by intensifying connectedness within and between cities operates a space convergence: the logic of networks penetrates the city; new entrepreneurial strategies for economic development are emerging.
- *TLC interactive services*, are becoming alternative to existing services (e.g., electronic mail), or make possible entirely new services (e.g. computer conferencing). Greater impacts is expected from experiments (e.g., speech recognition to translate into text, voice mail) and from extension of open learning.
- *2-way TV*, are experimented in local communities for democratic polls and for social services (e.g., for elderly: social services information, peer socializing, intergenerational contacts, citizen/ government interaction).

For the **communication aura** effect, one can underline the change induced by new technology on the home (*domotique*). *Domotique* implies the extended use of the IT and TLC to improve the use of the home as a shelter and as an extension of the socializing interests of the inhabitants. *Domotique* sees the home as a complex system of internal networks interacting with external ones. <sup>1</sup> It can provide a better living by: i) automated home services management, ii) increased security, iii) optional filtering of communication access, iv) better living for the elderly and the handicapped <sup>2</sup>, v) better liaisons with the external world (such as conference call, video telephone), vi) emergency intervention, vii) mobile alarm, viii) health home assistance, ix) home tele-banking and shopping, x) home tele-learning, xi) better information access for people with sensory impairments (improved communication ability).

Only few of the listed potential applications are currently existing in practice, such as: functional enhancements of telephone (abbreviate dialling/ follow-on, follow-me calls/ three-party calls), personal alert system with central monitoring unit, new telephone services (chat lines/ voice-based entertainment services), video-telephony, two partners video-conference.

The 'information and communication *aura*' is enhanced also in specially instrumented *intelligent buildings*. One application is for commercial buildings where special infrastructures (LAN two ways interconnections, dynamic computer load-sharing) make possible world-wide TLC interconnections and access to special services (digitized voice, electronic mail, remote printing and publishing, etc.). Intelligent buildings can affect enterprises organization (e.g. making efficient multiple small units), make convenient the housing of a mix of activities in the same building (office, commerce, homes). Other applications refers to specialized buildings as 'centre for civic activities and encounters' where is possible to find TLC means to communicate world-wide. One idea that has found local interest even in medium size cities is that of Multimedia Civic Centers, between a theater and a TV studio, that - with the aid of multimediality and special software programmes - will permit to create special cultural events (in collaboration with other cities in real time) whose novelty and creative potentialities we are far to grasp now (e.g., shows where the actions are inserted in 'virtual' architectures).

For the improvement in **process control of city sub-systems** most of the focus has been on the transportation subsystem, such as the control of traffic (intelligent traffic lights, communication to car drivers on the state of traffic, recognition of vehicle position for commercial vehicle fleets or for collective transport vehicles). Much more will come

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<sup>1</sup> One should remark, however, that the concept of the house as a series of interconnected networks is not new: there has been a steady progressing towards internal networks of services (energy, material, communications) inserted in external ones (central heating, water, gas, electricity, wastes, mail, telephone, etc).

<sup>2</sup> For many of the Activities of Daily Living (ADL) applications are already here: low vision (magnification and redirection of images, alternative input-output e.g. speech recognition), low hearing (visual displays, telephone volume control), manipulation (voice activated telephone), mobility (environmental control units, sensory guided wheelchairs)

soon. Just the collection of data by proper 'instrumenting' the city systems - even before being able to feed back the data into the system process control - will have dramatic effect on city management (see the decision to stop private car circulation when air pollution reach alarm threshold).

### 3. TLC CONTRIBUTION TO AN AGORA CITY SCENARIO

For an efficient urban planning, society needs to agree on the priority values and objectives, spelling them out in a desired 'scenario'. A new vision of urban plan is needed. Is technology available for whatever scenario? The answer is positive as can be argued by the two following extreme and caricatural scenarios:

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Starting from **shelter**, the home has passed from performing the simple function of shelter, to that of centre of socialization (a place to meet friends). ICT will add the role of information amplifier. *Domotique* by extending and completing the communication networks represent a true revolution - the 'intelligent' home - with the emergence of a different way to live the home. The risk is that, by the dependence from technology, it will push towards a de-responsabilized, standardized, de-humanized way of living. Conceiving the intelligent home to serve the individual, means to serve the aspiration towards: i) protection against the excess of the technical progress and related over-rationalization, ii) integrity of the individue and preservation of life (security, privacy, assistance), iii) freedom from ingrate tasks (from 'useful' time to 'leisure' time), iv) communication and information (to be connected with the world, to know all about everithing).

The urban planner can take advantage of the multifunctional roles of the home 'system' integrating it in the other functions that the citizens perform in the city.

Concerning **education**, the impact on city scenario comes from the transition of ICT from the processing of information to the process of knowledge. If a large fraction of work will consist of processing information (in countries such as USA already today 60% of working population) will impact the way of life in the city.

The knowledge processing revolution will change many activities: eg. the availability of expert systems (with computer aids new knowledge can be inferred from existing one) will increase the autonomy of the individual and the reach of do-it-yourself activities. The information bases deposited in libraries and museum can be valorized both on the spot and by tele-services (*virtual library*).

Concerning **work**, the urban planner has to think of the potentiality of telework. From the two above extreme scenarios, urban planner might focus on an intermediate one where the work organization will amplify the occasion of socialization (far from being an alien in a big office or an isolated individualist at home).

The concept of telework span from the decentralization of big offices into autonomous satellite units, 'dispersion' of work into small units, to 'diffusion' of home-working. This latter concept has limited application for big organizations and refers mainly to unskilled information processing tasks. It has instead implication for self-employers (freelancers, consultants, translators, insurance agents, etc) or supplementary work (as the home work of teachers). The fragmentation of large company into satellite offices will impact the building concepts which might host a mix of activities and functions.

To facilitate the decentralization of work of self-employed, *satellite work centers* can be realized (public shared facility centres) with work places equipped for telework. Self-employers and skilled workers might find there complementary expensive facilities to that available at home (multimedia network connection and processing). Experiment are being done in different countries. <sup>3</sup> *Community Teleservice Centres* are provided in remote location to reduce the handicap of geographic isolation (experiments in Nordic countries).

Concerning **leisure** activities, we will simply refer to one possibility among the many that can take advantage of ICT (eg. multimedia presentation of places for vacation). ICT could 'multiply' the possibility to follow cultural events (such as theaters show), by realizing a network of small public halls equipped with large screen HDTV where the play can be seen in real time (adding an extra effect of socializing with respect to diffusing the same show to homes).

In general the concept of an **agora city** should aim at recuperate the value of 'neighborhood' unpaired by the present city social fragmentation and subdivision of urban spaces into monofunctional ones. Three are the dimensions in the concept of neighborhood: a *social dimension* (feeling between friends), a *practical dimension* (to find the services needed, to work, to go to school), a *political dimension* (to share common interest, to be part of voluntary activities, etc.):

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<sup>3</sup> As an example, at the Hawaii Telework Demonstration Project 16, workplaces are provided partly for public employees and partly for private ones.

- For the *social dimension* ICT should help in restoring the local network of contacts and security. With ICT services one realize friendship virtual network. But socialization require direct physical contacts. In the past small shops and boutiques contributed. The economy of scale have killed many of them. An economy of scope can substitute for the economy of scale. Boutiques can be equipped for 'virtual shopping' showing by multimedia facilities the merchandize available in large store departments and collecting the client order.
- As for the *practical dimension*, local community, as a counterbalance to much 'domotique', can set up 'integrated service centers' where citizen might find a variety of services. Experiment designed by different names ('service shops', citizen offices, neighboring offices) are underway
- Concerning the *political dimension*, an important trend is for the municipality to decentralize offices, to set up civic tele-service space where people can access city information. Two ways TLC links will be instrumental for developing new methos for direct democracy (democratic polls). With reference to the old greek cities one can dream of a 'virtual agora' where people can express and compare their opinion on matter of public concern.

#### 4. TLC CONTRIBUTION TO AN HARMONIC GLOBAL/LOCAL CITY

The new 'agora' city should be able to find an equilibrium between a human centred local space and the 'multidimensional networked virtual' space in a **balanced 'local-global' (glocal)** vision of human activities.

The urban space has always been charaterized by networks of different kind. A basic demand for social justice is that of equality of access to networks. The availability of networks (transport, utilities, communications) is a prerequisite of social integration. Basic needs to access at no cost to the networks service has been assured in advanced society ('life-lines'). The availability of knowledge networks will pose even more the problem of equality of access and of *life-lines*.

To see the effect of *networkization* of urban space related to knowledge, consider education. From multimedia networks will emerge a 'network knowledge': shared in different media it can be processed on spot, stored in different parts, transmitted and teleprocessed. Today the educational tasks is taylorized, based on received truth in separated disciplines. Teaching is collective in a school class. The change induced by the knowledge processing is revolutionary. The basic skills to be learned is to acquire, process and apply technology. The role of the teacher is to guide the school boys in this task. Out of the school class, learning will continue at home (educational TV, videotex services, CD ROM, etc.), in civic '*media resources centers*' specially equipped to be connected to the knowledge network, and at the working place. By 'media resource centres', it is intended both the old libraries transformed (via computerization, multimedia knowledgfe storage, and network connection with other centres) and the museums (arts and sciences) which will also have completed the transition toward the multimedia processing of the 'exibited' knowledge (audiovisual aids, user friendly computer terminals, etc.). The potentiality of knowledge network will also impact the educational and cultural clubs to become centres of multimedia knowledge processing to better perform their voluntary tasks.

Teleports will connect the city to the entire world. There is a real risk that city become a weak fragmented set compared to the external networks that cross it.

The signal is evident by the increasing intercity competition to attract global actors. To this strategy TLC infrastructures and services are of primary importance. Successful cities are seen as hubs in the globalizing 'information economy'.

However, the intensification of connectedness within and between cities might produce a different outcome. In a cabled city equipped with processing facilities and with providers of special value services, a 'logic of networks' will emerge, leading to new entrepreneurial strategies for urban economic development reacting to the today trend of fragmentation of urban economies 'slaved' by global economy dominance. Telematic networks will create new liaisons for new partnerships in business or private.<sup>4</sup>

## 5. TLC CONTRIBUTION FOR A SUSTAINABLE CITY

Another important new aspect is the saturation and unsustainability of the city system. Lacking the possibility to increase the system capacity, the scenario has to include a new *wisdom of complexity* to regain governance by better understanding system dynamics so that human action be able to find multiplicative effects in the internal system forces to assure an intergenerational identity of the local diversity in an **autonomous and self-supported (sustainable)** city system.

Saturation of urban system often appears as saturation on the capability of city networks. The case of the transport networks is the more evident. Saturation might be real or due to inefficient uses of the network capabilities. In the case of water supply, the dispersion of water due to leakages, mismanagement of reservoirs, failure of preventive maintenance might be responsible of the supply-demand mismatch. Information collection helps optimizing network management. Telephony already played an important role. ICT will make possible to even conceive a 'network of networks': an information network collects data from the different networks and takes advantage of common processing and exchange of data for a better global management. Information network will permit a hierarchical management where decision will be taken at the proper level.<sup>5</sup> In general, one can say that the application of ICT - with the aid of new sensors, planning schedules, modeling techniques, flexible control and operation strategies - will permit to operate the actual networks as close as possible to the 'virtual' network (that match ideally demand and

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<sup>4</sup> The necessity to promote urban use of TLC potentialities is well recognized and experimentations are underway. France has promoted several initiatives: Urban 2000, a national think tank to provide support and guidance to urban telematics initiatives (cabling, teleports, videotex); 'Observatoire de TLC dans la Ville', which promotes studies, debates, local telematics experiments; ZTA (Zone de Telecommunications Avancée) to promote, with government support, special areas inside a teleport city equipped to take most advantage of TLC.

<sup>5</sup> E.g., in the case of traffic light control the strategies permit to the local light to react to local traffic within constraints decided by a central traffic control strategy.



supply with no time delay).<sup>6</sup>

Another important field for ICT network to respond to 'city system' problem is that of security. Social fragmentation has reduced the feeling of security that in the past were assured by the 'proximity' of relatives, friends, known people. ICT can provide means to fill the hole by automatic signaling, advanced sensors, 'intelligent' data processing, use of wired city potentialities. An example: image processing showing fastest route to a place can help patrol intervention.

ICT can also help in optimizing the logistic of supply the city material needs, as it has already contributed to modify the industrial production strategy (just-in-time supply of parts and components, use the dealers storage as an integrated network to faster meet the client demand.<sup>7</sup>

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## ABSTRACT

The many problems of large cities are so grouped: i) connected with the city space planning, ii) related to the de-localization induced by globalization, iii) due to the saturation and unsustainability of city systems. ICT can help in diagnosing the 'urban malaise' and developing solutions. ICT 'building blocks' are available, such as: TLC infrastructures, ICT services, intelligent buildings, process control. The review of ICT potentiality refers to: i) realize a better liveable city scenario (agora city), ii) harmonize the attraction from outer globalization and the local diversity assets, and iii) contribute for a sustainable city.

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<sup>6</sup> Examples of common information network for utilities networks are underway in France (ASTARTE system), in Germany (TEMEX system) and other countries.

<sup>7</sup> See, eg., the ODETTE system used by car manufacturers.